JOURNAL

OF THE

American Veterinary Medical Association

FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

H. Preston Hoskins, Secretary-Editor, 716 Book Building, Detroit: Mich.

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Vol. LXXIV, N. S. Vol. 27 May, 1929 No. 6

MEMBERSHIP CAMPAIGN

One of the best organized membership campaigns ever launched by the A. V. M. A. is now under way. President Munce has written a personal letter to every one of our resident state and provincial secretaries, fifty-eight in number, asking for their active cooperation in bringing to the attention of non-members the activities of the national organization and the desirability of becoming affiliated with it. As pointed out by President Munce, every veterinarian in the country derives some benefit from the projects fostered by the A. V. M. A., whether a member or not. Certainly those veterinarians who do not support the organization through membership should not want to go on and allow their colleagues who are members to shoulder the entire burden.

Dr. F. A. Imler, president of the National Association of B. A. I. Veterinarians, is lending his support to our campaign in splendid fashion. He has appointed a chairman in each state to work among the B. A. I. veterinarians in his state and acquaint them with the value of A. V. M. A. membership. Dr. Imler has sent letters to all inspectors-in-charge, asking their cooperation. In addition he has written a letter to all veterinarians in the B. A. I. service, both members and non-members, asking their support.

Judging from the letters and requests for applications being received from some of our resident secretaries, active campaigns are already being waged in a number of states. The result of these efforts is reflected in the number of new applications listed this month. Those given first listing this month bring the total number of applications filed since the Minneapolis meeting up to 259. The following table shows how the first five months of the year 1929 compare with the same period in previous years:

	1925	1926	1927	1928	1929
January	2	4	10	15	42
February	9	22	28	36	45
March	6	10	14	41	24
April	10	12	15	57	26
May	7	28	16	26	56
Totals	34	76	83	175	193

In the competitior among the resident secretaries, Dr. W. L. Curtis, of California, still continues to have things all his own way. On April 24, the standing of the five leaders was as follows:

California (Dr. W. L. Curtis) 98
Pennsylvania (Dr. G. A. Dick) 34
Michigan (Dr. A. S. Schlingman) 28
Illinois (Dr. C. C. Hastings) 21
New York (Dr. J. Elliott Crawford) 14

Incidentally it might be mentioned that Dr. Curtis has broken a record that has stood for five years. In 1924, Dr. W. F. Guard, resident secretary for Iowa, turned in a total of 95 applications. Dr. Curtis, it will be noted, has already passed Dr. Guard's old mark and the year is only two-thirds gone. California passed Iowa some time ago, in respect to total members. Pennsylvania also has passed Iowa and now threatens to overtake California.

MORE FIGURES

Continuing our statistical studies of A. V. M. A. membership strength in different states, this month we are presenting figures for six more states, located in different parts of the country, and the District of Columbia. It will be noted that the number of members in these states at the present time varies from 86 in New Jersey to 46 in both Washington and Colorado. The membership figures for 1929 give effect to all applications that are pending at the present time, as well as the new members whose applications will be completed May 1.

Following are the comparative figures for the years 1923 and 1929:

State	*1923*	*1929*	*Change*
New Jersey	69	86	+17
Massachusetts	71	81	+10
South Dakota	46	68	+22
Maryland	45	51	+ 6
Kentucky	56	50	— 6
District of Columbia	52	48	— 4
Washington	41	46	+ 5
Colorado	60	46	—14

It will be noted that New Jersey is credited with one more member than Nebraska, included in the figures published last month and shown with 85 members. This apparent inconsistency is easily accounted for. Examination of the applications for membership now on file, both first listing and second listing, will reveal six from the state of New Jersey. At the rate applications are coming in from New Jersey, we would not be surprised to see this state credited with 100 members by the time of the Detroit meeting.

Massachusetts has done well, in spite of frequent losses by death during recent years. The table shows a gain of ten for the six-year period, or an average of approximately two members per year.

South Dakota shows an increase of almost 50 per cent over the 1923 figures, having 22 more members this year than were credited to the Sunshine State in 1923. During this time, Dr. C. C. Lipp, of Brookings, has been resident secretary for South Dakota and has done splendid work in bringing the A. V. M. A. to the attention of non-members in his state, with the result that each year recently has shown a nice increase over the year before. Last year, with the meeting in Minneapolis, an unusually large number of veterinarians from South Dakota joined.

Examination of the table shows Maryland with a slight gain and the District of Columbia with a slight loss. To be fair, these two should be considered together, as investigation shows that a number of veterinarians who were credited to the District of Columbia in 1923 are now credited to Maryland as a result of their removal from Washington to some nearby point in the Old Line State. This applies in a number of cases to veterinarians connected with the Bureau of Animal Industry Experiment Station at Bethesda, Md. Considering Maryland and the District of Columbia as a unit, a net gain of two members is shown this year over 1923.

Kentucky shows a loss of six members. This is in spite of the fact that the A. V. M. A. met in Lexington in 1926. Contrary to the general rule, Kentucky did not show any great increase in membership during 1926 as a result of the meeting held in the Blue Grass State that year. This was probably due to the fact that the State had been pretty thoroughly combed during the several years preceding the meeting.

Washington has shown a consistent increase in membership right along. The increase has not been large for any one year, even for 1925, when the A. V. M. A. met in Portland. As a matter of fact, there are few states that have shown the steady consistent growth that Washington has. The number of veterinarians in the Evergreen State is not large and a net increase of five over a six-year period is highly creditable.

In the group of states considered this month, Colorado is the only one to show much of a loss, having 14 fewer members at the present time than was the case six years ago. This loss in Colorado is rather difficult to explain, in view of the fact that there have been approximately 20 new members added to the roll of the Centennial State during the six years for which figures are being presented. There is some evidence to indicate that there has been a migration of veterinarians from Colorado into other states.

Next month another group of states will receive our attention.

MERGER

The announcement that five of the leading producers and distributors of veterinary biological and pharmaceutical products have been merged into one corporation did not occasion a great deal of surprise among those who have been familiar with the purely business side of things during recent years. Mergers in other lines of business have become commonplace and usually they have been brought about for the same reasons that prompted the formation of Allied Laboratories, Inc.

With particular reference to anti-hog cholera serum, such terms as "cut-throat competition," "hazardous enterprise," and "unprofitable business" have been heard frequently in veterinary circles during recent years. One of the aims of any merger is to effect economics in manufacture, sale and distribution of products, by reduction of overhead expenses and curtailing needless duplication of effort. Another important object is standardization of

the product or products sold by the companies consolidated. Considering the present chaotic state of veterinary biological nomenclature, there is much to be hoped for in this direction.

However, the plans of the new company for a nation-wide advertising campaign in behalf of the veterinary profession are of paramount interest at this time. Briefly stated, this program has for its object the stimulation of the demand for veterinary services upon the part of owners of animals. The latter are to be reached through both the reading and advertising columns of the farm press. One of the features of this advertising will be to point out the penny-wise, pound-foolish policy of trying to get along without professional veterinary services and that a continuation of such a policy, upon the part of the farmers and breeders in any locality, will work out to their disadvantage in the end, by depriving them of a competent veterinary service upon which they can rely in an emergency. There is no satisfactory substitute for veterinary service.

We would not be surprised to hear of other mergers.

CHANGE OF ADDRESS

It again becomes necessary for us to direct the attention of our members to the urgent necessity for reporting changes of address promptly. This is absolutely essential in connection with the JOURNAL, which will not be forwarded from one post office to another, free of charge, even if your change of address is on record at the post office. We guarantee the postage on all undelivered copies of the JOURNAL which are returned to this office. We do this in the interest of our members. In the course of a year this costs a good many dollars. We do everything that is humanly possible to keep your JOURNAL coming to you regularly each month. Please cooperate with us by reporting changes of address promptly. A post card is all that is necessary. We repeat—that the JOURNAL will *not* be forwarded from one post office to another unless somebody provides the postage. Only first-class mail is forwarded from one office to another without the payment of additional postage. Please keep this in mind.

EXECUTIVE BOARD ELECTION

The polls for the nomination of candidates for member of the Executive Board to represent District No. 4 were closed April 13 and shortly thereafter ballots were mailed to all members of

District No. 4 in good standing. The Board of Tellers consisted of Drs. E. E. Patterson and L. H. LaFond, of Detroit, and the Secretary-Editor. The number of ballots cast was the smallest in any Executive Board election that has been held during the past five years. The five candidates who stood at the head of the list, after the completion of the tabulation of votes, are as follows:

CARY, C. A. Auburn, Ala.
Dean, College of Veterinary Medicine, Alabama Polytechnic Institute. Graduate of Iowa State College, 1885. Joined A. V. M A., 1890. Fifth vice-president, 1907-1908; member of Executive Committee, 1910-1911; member of Committee on Revision of Constitution and By-laws, 1915-1916; member (1918-1919) and chairman (1925-1928) of Committee on Resolutions; president, 1919-1920; member of Committee on International Veterinary Congress, 1919-1921.

MOHLER, JOHN R. Washington, D. C.
Chief, Bureau of Anmal Industry, U. S. Department of Agriculture. Graduate of University of Pennsylvania, 1896. Joined A. V. M. A., 1898. President, 1912-1913; editor of the JOURNAL, 1920-1923; member of the Executive Board, 1916-1919 and 1924-1929.

MOORE, WILLIAM Raleigh, N. C.
State Veterinarian of North Carolina. Graduate of the U. S. College of Veterinary Surgeons, 1911. Joined A. V. M. A., 1926. Resident secretary of North Carolina, 1926-1929.

RICHARDSON, A. G. G. Athens, Ga.
Professor of Veterinary Medicine, Georgia State College of Agriculture. Graduate of the University of Pennsylvania, 1894. Joined A. V. M. A., 1899. Resident secretary of Georgia, 1921-1925.

TURNER, JOHN P. Washington, D. C.
Practitioner. Graduate of the University of Pennsylvania, 1890. Joined A. V. M. A., 1891. Member of Committee on Legislation, 1906-1911, 1912-1915, 1916-1921 and 1926-1929 (chairman, 1906-1911, 1920-1921, and 1926-1929). Fourth vice-president, 1911-1912; resident secretary of District of Columbia, 1926-1927.

On the same day that the primary election was brought to a close, a letter was received from Dr. J. R. Mohler, in which he stated that he did not "choose" to be a candidate for re-election to succeed himself. This is a contingency that is not covered by those sections of the By-laws which prescribe the manner for holding elections of Executive Board members. It is believed that this is the first time that a member has declined to be a candidate in these elections. There did not appear to be anything to do other than to list Dr. Mohler as one of the candidates and to accompany each ballot by a statement explaining that Dr. Mohler was not a candidate for reelection. Such a statement was prepared and a copy accompanied each ballot. This contingency should be covered by an appropriate section in the By-laws, as it is easily conceivable that there may be occasions, as in

the present instance, when a member may have good reasons for not wanting his name to appear on the ballot even though he may have received sufficient votes to place him among the first five.

APPLICATIONS FOR MEMBERSHIP

(See December, 1928, JOURNAL)

FIRST LISTING

BLAMEY, EDWIN REGINALD 17 W. 71st St., New York, N. Y.
M. R. C. V. S., Royal Veterinary College, 1906
Vouchers: J. Elliott Crawford and C. G. Rohrer.

BOTTORFF, CHARLES A., JR. University of New Hampshire, Durham, N. H.
D. V. M., Washington State College, 1928
Vouchers: Carl L. Martin and Fay F. Russell.

BOYD, ROBERT Box 53, Mill Valley, Calif.
D. V. M., San Francisco Veterinary College, 1916
Vouchers: Joseph M. Arburua and John McInnes.

BRANDNER, WALTER E. Petaluma, Calif.
D. V. M., Colorado Agricultural College, 1926
Vouchers: Joseph M. Arburua and C. M. Haring.

BREININGER, CHAS. B. 624 Goldsborough St., Easton, Md.
M. D. V., McKillip Veterinary College, 1908
Vouchers: C. A. Turner and T. E. Munce.

BRITTEN, MART S. Box 327, Harrisburg, Pa.
D. V. M., Grand Rapids Veterinary College, 1915
Vouchers: J. B. Reidy and T. E. Munce.

BUSHONG, JESSE W. West Grove, Pa.
V. M. D., University of Pennsylvania, 1908
Vouchers: Henry W. Turner and T. E. Munce.

CLARKSON, P. V. Box 327, Harrisburg, Pa.
V. M. D., University of Pennsylvania, 1922
Vouchers: J. B. Reidy and T. E. Munce.

COLFLESH, JOSEPH HARMON 537 Hugart St., Confluence, Pa.
D. V. M., George Washington University, 1914
Vouchers: J. B. Reidy and S. E. Bruner.

COTTON, HARRY L. 18479 Trinity Ave., Detroit, Mich.
D. V. M., Ohio State University, 1913
Vouchers: R. F. Vermilya and A. S. Schlingman.

CRAVEN, HARRY T. Reynoldsville, Pa.
D. V. M., Chicago Veterinary College, 1913
Vouchers: J. B. Reidy and S. E. Bruner.

CRAWFORD, JAMES STUART 708 Broadway, Far Rockaway, L. I., N. Y.
D. V. M., Cornell University, 1927
Vouchers: J. Elliott Crawford and Lawrence W. Goodman.

CRAWFORD, JOHN ELLIOTT 708 Beach 19th St., Far Rockaway, L. I., N. Y.
D. V. M., Cornell University, 1926
Vouchers: J. Elliott Crawford and Lawrence W. Goodman.

DARLING, ROBERT 3630 Georgia St., San Diego, Calif.
D. V. S., McGill University, 1889
Vouchers: A. P. Immenschuh and Irving G. LaRue.

DICK, THOMAS CRAWFORD Box 104, Mineola, N. Y.
M. R. C. V. S. and L. D. V. S., New Veterinary College (Edinburgh), 1895
Vouchers: J. Elliott Crawford and Lawrence W. Goodman.

DODGE, LOREN N. 219 N. Massey St., Watertown, N. Y.
D. V. M., Cornell University, 1921
Vouchers: D. H. Udall and W. J. Gibbons.

DORNING, JOSEPH V. 1347 W. Walnut St., Shamokin, Pa.
V. M. D., University of Pennsylvania, 1913
Vouchers: J. B. Reidy and T. E. Munce.

ELKOW, STEPHEN R. 13153 Hamilton Ave., Highland Park, Mich.
B. V. Sc., Ontario Veterinary College, 1923
Vouchers: A. S. Schlingman and H. Preston Hoskins.

ENGLE, JOSEPH B. Box 432, Summit, N. J.
D. V. M., Cornell University, 1926
Vouchers: E. R. Cushing and J. Elliott Crawford.

FEELYATER, EARLL MILTON Randolph, Wis.
M. D. C., Chicago Veterinary College, 1911
Vouchers: James S. Healy and H. D. Larzelere.

GRAHAM, DONALD Box 198, Gonzales, Calif.
D. V. M., San Francisco Veterinary College, 1918
Vouchers: A. C. Rosenberger and Geo. Gordon.

GRINNELLS, C. D. State College Station, Raleigh, N. C.
B. S. and M. S., University of Minnesota
D. V. M., Cornell University, 1918
Vouchers: W. C. Dendinger and Wm. Moore.

GURNEY, HARRY L. 3994 Iowa St., San Diego, Calif.
M. D. V., McKillip Veterinary College, 1903
Vouchers: L. K. Knighton and A. P. Immenschuh.

HANEY, WILLIAM FRANCIS 1414 9th St., Modesto, Calif.
D. V. M., San Francisco Veterinary College, 1910
Vouchers: R. A. Cilker and E. H. Barger.

HUGHES, ARTHUR H. 1626 E. Houston St., San Antonio, Texas
D. V. M., Kansas City Veterinary College, 1915
Vouchers: N. F. Williams and T. O. Booth.

JENSEN, THOMAS JELMER Arkdale, Wis.
D. V. M., Chicago Veterinary College, 1915
Vouchers: James S. Healy and H. D. Larzelere.

JOHNSON, JOSEPH Union Stock Yards, Lancaster, Pa.
V. M. D., University of Pennsylvania, 1898
Vouchers: Henry W. Turner and T. E. Munce.

KUTZ, HARRY COOPER Mansfield, Pa.
V. M. D., University of Pennsylvania, 1914
Vouchers: J. B. Reidy and T. E. Munce.

LYNCH, RAYMOND J. Dushore, Pa.
V. M. D., University of Pennsylvania, 1923
Vouchers: Robert G. Little and Robert O. Biltz.

McGROARTY, WILLIAM V. Smethport, Pa.
V. M. D., University of Pennsylvania, 1912
Vouchers: J. B. Reidy and T. E. Munce.

McINTYRE, HOWARD HOKE Box 1013, Detroit, Mich.
B. S., Michigan State College
D. V. M., Michigan State College, 1915
Vouchers: Ward Giltner and B. J. Killham.

MILO, HOWARD ALFRED 458 Ella St., Williamsburg, Pa.
V. M. D., University of Pennsylvania, 1916
Vouchers: J. B. Reidy and S. E. Bruner.

MORRIS, ERALSEY CHARLES 3650 F St., Eureka, Calif.
D. V. M., San Francisco Veterinary College, 1918
Vouchers: W. J. Lembke and Joseph M. Arburua.

MOULTON, CECIL 1494 4th St., San Rafael, Calif.
D. V. M., San Francisco Veterinary College, 1918
Vouchers: Joseph M. Arburua and John McInnes.

MURDOCH, JAMES W. Capitol Station, Helena, Montana
D. V. S., Kansas City Veterinary College, 1911
Vouchers: Hadleigh Marsh and W. J. Butler.

PEASE, RAY HERBERT Box 753, Los Banos, Calif.
D. V. M., Colorado Agricultural College, 1927
Vouchers: A. C. Rosenberger and Geo. Gordon.

PFEIFFER, WALTER F. R. 5, Plymouth, Wis.
D. V. M., Chicago Veterinary College, 1918
Vouchers: James S. Healy and H. D. Larzelere.

PICKERING, CLIFFORD E. Fort Mason, Calif.
D. V. S., Washington State College, 1909
Vouchers: Joseph M. Arburua and John McInnes.

PIER, B. CLARK El Heusah Apts., Dover, Del.
D. V. M., Colorado Agricultural College, 1925
Vouchers: Frank Hare and Leland D. Ives.

PLANK, NEIL 332 Federal Bldg., Lincoln, Nebr.
D. V. M., Kansas City Veterinary College, 1917
Vouchers: A. H. Francis and C. H. Hays.

POLEY, PHILIP P. 33 Abeel St., Kingston, N. Y.
D. V. M., Cornell University, 1928
Vouchers: M. G. Fincher and D. H. Udall.

QUARLL, JOSEPH T. R. D. No. 1, Avondale, Pa.
V. M. D., University of Pennsylvania, 1904
Vouchers: Henry W. Turner and T. E. Munce.

RAMLER, JOHN VERLIN Box 85, Wheaton, Minn.
D. V. M., Kansas City Veterinary College, 1918
Vouchers: H. C. H. Kernkamp and R. Fenstermacher.

ROBENSTEIN, C. C. Hugo, Colo.
D. V. M., Colorado Agricultural College, 1920
Vouchers: Wm. E. Patterson and W. E. Howe.

RUDDLE, OLIN HARRISON Box 23, Salem, Va.
D. V. M., Indiana Veterinary College, 1918
Vouchers: H. C. Givens and R. E. Brookbank.

SCHUEY, GEORGE BERNARD 526 Todd St., Wilkinsburg Sta., Pittsburgh, Pa.
V. S., Ontario Veterinary College, 1910
Vouchers: J. B. Reidy and T. E. Munce.

SMITH, STANLEY N. 501 Rollins St., Columbia, Mo.
V. S., New York College of Veterinary Surgeons, 1893
Vouchers: J. D. Ray and A. T. Kinsley.

STADER, OTTO 2318 E. Johnson, Madison, Wis.
V. M. D., University of Pennsylvania, 1918
B. S. A., University of Wisconsin, 1920
Vouchers: James S. Healy and H. D. Larzelere.

TAYLOR, H. HAYWARD 101 W. 2nd St., Media, Pa.
V. M. D., University of Pennsylvania, 1928
Vouchers: J. B. Reidy and T. E. Munce.

THOMAS, JOHN JOSEPH 101 Welles St., Forty Fort, Pa.
V. M. D., University of Pennsylvania, 1917
Vouchers: W. S. Gimper and T. E. Munce.

THOMPSON, ARVO THEODORE Box 403, Harrisburg, Pa.
D. V. M., Ohio State University, 1928
Vouchers: M. F. Barnes and Robert O. Biltz.

URICH, JOHN RUSSELL Rossville, Pa.
D. V. M., Indiana Veterinary College, 1918
Vouchers: J. B. Reidy and S. E. Bruner.

WILEY, J. ROSS 705 North Shippen St., Lancaster, Pa.
V. M. D., University of Pennsylvania, 1917
Vouchers: Robert O. Biltz and T. E. Munce.

WORRELL, TEMP JEFFERSON Box 1725, Pampa, Texas
D. V. M., Arkansas Veterinary College, 1917
Vouchers: N. F. Williams and T. O. Booth.

YODER, EDWIN C. Birdsboro, Pa.
V. S., Ontario Veterinary College, 1893
Vouchers: J. B. Reidy and S. E. Burner.

ZIMMERMAN, ELIJAH ROBERT Mifflinburg, Pa.
V. S., Ontario Veterinary College, 1915
Vouchers: J. B. Reidy and S. E. Bruner.

Applications Pending

SECOND LISTING

Anderson, A. R., 5956 Van Nuys Blvd., Van Nuys, Calif.
Anderson, Otto Carl, 208 Griswold Rd., Northville, Mich.
Beller, Leonard Iven, 10316 Long Beach Blvd., Huntington Park, Calif.
Boomer, John B., 530 Fulton St., San Francisco, Calif.
Cozzens, Joseph D., 2121 Pico Blvd., Santa Monica, Calif.
Cross, Floyd, 711 Mathews St., Fort Collins, Colo.
Dowd, Gerald R., James Law Hall, Cornell University, Ithaca, N. Y.
Edmunds, Colonel E., Orlando Ave., Ardsley, N. Y.
Farquharson, James, Veterinary Hospital, Fort Collins, Colo.
Garbutt, Raymond J., 24th St. and Avenue A, New York, N. Y.
Harrison, Jas. B., 3854 Federal Blvd., Denver, Colo.
Hoyt, Floyd E., Central Square, N. Y.
Jensen, Walter Daniel, Grant, Nebr.
Kline, George John, 23410 Woodward Ave., Ferndale, Mich.
Lee, Ward Royal, Box 338, Sacramento, Calif.
Litton, Clyde T., 345 E. Redondo Blvd., Inglewood, Calif.
Locke, Geo. H., Lockeford, Calif.
McCormick, Thomas Joseph, 2043 19th Ave., San Francisco, Calif.
McFarland, Ray A., 907 9th Ave., Monrovia, Calif.
Miller, W. Taylor, 210 Delaware Ave., Ithaca, N. Y.
Munro, Alexander Duncan, Petaluma, Calif.
Poole, Hiram L., 237 Linden Ave., Long Beach, Calif.
Pope, Ira S., 531 Burnham Road, Elizabeth, N. J.
Sturm, George Arthur, Bad Axe, Mich.
Swartz, Russell Phillip, 436 San Fernando Road, Los Angeles, Calif.
Weller, Emil Emanuel, 53 Park Place, New York, N. Y.

The amount which shall accompany an application this month is $8.33 which covers membership fee and dues to January 1, 1930, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

Connecticut Veterinary Medical Association. New Haven, Conn. May 1, 1929. Dr. E. H. Patchen, Secretary, Milford, Conn.

New York City, Veterinary Medical Association of. Academy of Medicine, 5th Ave. and 103rd St., New York, N. Y. May 1, 1929. Dr. Raymond J. Garbutt, Secretary, 305 W. 91st St., New York, N. Y.

San Diego-Imperial Veterinary Medical Association. San Diego, Calif. May 1, 1929. Dr. A. P. Immenschuh, Secretary, Santee, Calif.

Hudson Valley Veterinary Medical Society. Catskill, N. Y. May 8, 1929. Dr. J. G. Wills, Secretary, 122 State St., Albany, N. Y.

Southeastern Michigan Veterinary Medical Association. Detroit, Mich. May 8, 1929. Dr. H. Preston Hoskins, Secretary, 716 Book Bldg., Detroit, Mich.

Chicago Veterinary Society. Great Northern Hotel, Chicago, Ill. May 14, 1929. Dr. J. B. Jaffray, Secretary, 2956 Washington Blvd., Chicago, Ill.

Kansas City Association of Veterinarians. New Baltimore Hotel, Kansas City, Mo. May 14, 1929. Dr. J. D. Ray, Secretary, 400 New Centre Bldg., Kansas City, Mo.

Southern California Veterinary Medical Association. Chamber of Commerce Bldg., Los Angeles, Calif. May 15, 1929. Dr. W. L. Curtis, Secretary, 1264 W. 2nd St., Los Angeles, Calif.

California State Veterinary Medical Association. Sequoia National Park, Calif. June 10-12, 1929. Dr. W. L. Curtis, Secretary, 1264 W. 2nd St., Los Angeles, Calif.

Eastern States Tuberculosis Eradication Conference. Municipal Auditorium, Springfield, Mass. June 18-19, 1929. Dr. E. A. Crossman, Chairman, Program Committee, 2001 Customhouse Bldg., Boston, Mass.

New York State Veterinary Medical Society. Ithaca, N. Y. June 19-20, 1929. Dr. C. E. Hayden, Secretary, 110 Irving Place, Ithaca, N. Y.

North Carolina State Veterinary Medical Association. Asheville, N. C. June 22-27, 1929. Dr. W. T. Scarborough, Secretary, 320 S. Blount St., Raleigh, N. C.

Michigan State Veterinary Medical Association. East Lansing, Mich. June 25, 1929. Dr. E. K. Sales, Secretary, 535 Forest St., East Lansing, Mich.

Missouri Veterinary Medical Association. State Fair Grounds, Sedalia, Mo. June 25-27, 1929. Dr. J. D. Ray, Secretary, 400 New Centre Bldg., Kansas City, Mo.

American Veterinary Medical Association. Book-Cadillac Hotel, Detroit, Mich. August 13-16, 1929. Dr. H. Preston Hoskins, Secretary, 716 Book Bldg., Detroit, Mich.

STATE BOARD EXAMINATION

Wisconsin Board of Veterinary Examiners. Capitol Bldg., Madison, Wis. June 25-26, 1929. Dr. T. H. Ferguson, Secretary, Lake Geneva, Wis.

SOME OF THE PHYSICO-CHEMICAL PROPERTIES OF THE VIRUS OF HOG CHOLERA*

By H. C. H. KERNKAMP

Division of Veterinary Medicine, University of Minnesota, University Farm, St. Paul, Minn.†

INTRODUCTION

Relatively few investigations pertaining to the etiology of hog cholera have been undertaken for the past quarter of a century. The reasons for this are quite apparent. The discovery, in 1903, by de Schweinitz and Dorset[3] that the causative agent of hog cholera is a filtrable substance marks the last outstanding contribution on this particular phase of the disease. Since then it has been classified with the group of diseases generally referred to as "filtrable virus" diseases. This group, according to Rivers,[10] "has been used to a considerable extent for the indiscriminate segregation of infectious disease of unknown etiology." The discovery and demonstration by Dorset, McBryde and Niles[5] of a preventive treatment for hog cholera had a marked influence in curtailing further work on the etiology of this disease. It should not be inferred that the question of the etiology of hog cholera has been entirely ignored. Some rather extensive investigations have been conducted along this line. In fact, certain specific particulate bodies were described as the causative agent of this disease, but the findings, however, have never been accepted as valid.

The present study was suggested in part by a report by Kramer[9,10] describing the properties of a filter which will remove electro-negatively charged substances. If the filtrate of hog-cholera virus, after passage through a filter of this type, is avirulent, theoretically it indicates that the causative factor possesses negatively charged properties or that it is associated with something possessing a negative charge. It has been shown that the siliceous filters commonly used in the laboratory are electro-negatively charged and the passage of the virus through this type of filter is definitely known. Experiments on the passage of hog-cholera virus through the electro-positively charged

*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.

†This work was done in the Department of Veterinary Investigation, Division of Veterinary Medicine, Iowa State College, Ames, Iowa, in 1927-28, and is based on a part of a thesis submitted in partial fulfillment for the degree M. S.

filters of Kramer are reported below. Another part of the investigation deals with the filtration through collodion membranes.

Historical

Between the years 1902 and 1905, there occurred important investigations that markedly increased our knowledge of hog cholera. This period marked a revamping of the conceptions of the etiology of this disease. The cause of hog cholera shifted from a visible microorganism, discovered by Salmon and Smith,[21] to an invisible and filtrable virus. The latter was the discovery of de Schweinitz and Dorset.[3] Their report, in 1903, cites the results of a preliminary investigation and contains the following statement which is still of great significance:

> We have transferred the disease repeatedly from one hog to another by subcutaneous inoculation of certain body fluids, those fluids being always proved by careful bacteriological examination, by filtration through the finest porcelain filters, and by inoculations of guinea pigs and rabbits, to be free from hog cholera and swine plague bacilli.

Two years later, Dorset, McBrdye and Niles[5] submitted a comprehensive report of a study on the etiology of hog cholera. Blood serum derived from cholera-affected swine and proven to be free from the hog cholera bacillus, *Salmonella suipestifer*, was passed through bacterial filters and injected into susceptible swine. Berkefeld filters 5 and 7 and Chamberland F and B filters were used for the filtration experiments. Swine inoculated with the filtrates manifested all the characteristics of the natural disease and when filtered blood was used the results correlated. When *S. suipestifer* was injected, the disease that was sometimes produced did not show the characteristics of hog cholera. These authors concluded that this organism was not the cause of hog cholera. The same year (1905), McClintock, Boxmeyer and Siffer[12] reported results they had obtained by inoculating susceptible swine with bacteria-free filtrates of blood and peritoneal fluid from cholera-affected pigs. The inoculated pigs sickened and died and showed the characteristics of hog cholera. Hutyra,[7] in 1905 and 1906, demonstrated that a disease of swine caused by a filtrable virus existed in Hungary. In 1908, Uhlenhuth, Xylander, Hubener and Bohtz[22] report the results of an extensive investigation of schweinepest (hog cholera) in Germany. From their experiments they concluded that the etiological factor is a filtrable, ultravisible agent and that *S. suipestifer* is not the true cause. Their report shows that the virus was obtained from five

different outbreaks of the disease, a point which adds much to the discovery.

The studies of the above workers and those of others have shown that the blood of cholera-affected swine contains the virus and that through this medium the disease can be artificially transferred from affected to susceptible swine with ease. In the process of producing hyperimmunes for the manufacture of anti-hog cholera serum, great quantities of blood from cholera-affected swine are used. The virus employed in the simultaneous treatment against hog cholera is defibrinated blood obtained from a cholera-diseased pig. Blood plasma therefore is an excellent medium to use in studies of the virus of hog cholera. Blood plasma, containing as it does the corpuscular as well as the serum portions of the blood, is not wholly desirable for certain filtration experiments. The blood serum which is more satisfactorily used contains the virus in the case of hog cholera. Dinwiddie,[4] although firmly of the opinion that the virulent bodies were for the most part intracorpuscular, points out that serum naturally expressed by the contraction of the clot, when withdrawn 24 hours later and centrifuged or filtered, is still infectious.

The infectiousness of the blood serum is further demonstrated by the experiments of Porter.[18] He endeavored to compare the virulence of whole blood (defibrinated blood) with clarified blood (blood serum) from cholera pigs at different periods after phenolization. It was found that the phenolized blood-serum virus, 139 days after collection and phenolization, did not cause hog cholera when injected into susceptible swine, whereas the defibrinated-blood virus of the same date of collection and phenolization was still virulent. Where comparisons were made on viruses of lesser age, the clarified virus manifested the same potency as the whole-blood virus in every instance. In another experiment Porter tested the immunity of 212 swine that had been treated by the serum-virus method. The virus used in this case was the clarified virus. It was used in doses of 2 cc and the serum in doses of 30 to 40 cc. As a test of their immunity they were given hyperimmunizing doses of defibrinated hog-cholera blood after a period ranging from five to nine months from the time of vaccination. None of the swine succumbed to this treatment. These results also indicate that the causative agent exists in the serum portion of virulent blood.

Roderick and Schalk [20] report a series of experiments with small doses of virus serum, as a result of which they reached the

following conclusion: "It would appear, therefore, that .00002 cc of the virus serum . . . was sufficient to produce an infection with hog cholera." The findings of these investigators leave no doubt as to the existence of the virus in the blood serum of cholera-affected swine. In the classic experiments of Dorset *et al*,[5] the experiments that demonstrated the filtrability of the hog-cholera virus, the serum portion of the blood of diseased pigs was used for the filtrant.

The filtrability of the hog-cholera virus, as is the case with other filtrable viruses, is based on the fact that the specific active substance will pass through a standard bacterial filter. The standard laboratory bacterial filters in general use are the Chamberland, Berkefeld and Mandler filters. In the case of the early filtration experiments with hog-cholera virus it is interesting to note that Dorset and his co-workers employed Chamberland and Berkefeld filters, as did also McClintock, Boxmeyer and Siffer. Hutyra used Chamberland, and Ostertag[17] employed Berkefeld filters. Berkefeld and Pukal filters were used by Uhlenhuth, Xylander, Hubener and Bohtz.[22] These filters are made of either porcelain, sand or diatomaceous earth and, according to Kramer,[9] are electro-negatively charged. In this connection Mudd[14] states that the contact surfaces of the pores of a Berkefeld filter and the fluid bathing them are the site of an electrical potential difference, an ordinary Helmholtz double layer, the solid walls carrying a negative and the liquid a positive charge. Olitsky and Boez[16] examined different types of Chamberland and Berkefeld filters and conclude that all are electro-negatively charged. Kramer points out that the substances which pass the ordinary siliceous filters carry the same electrical charge, i. e., the filter being negatively charged and the particular substances in the filtrant negatively charged, result in their passage through the filter. This he has demonstrated by filtering out certain colloids possessing positive color ions when these are passed through filters electro-negatively charged. A filter was devised and prepared by Kramer which he says carries a positive charge. With this type of filter, Congo red, having an electro-negative color ion, is removed in the process of filtration, while Victoria blue, which has an electro-positive color ion, passes through. The reverse of this occurs if the usual or silicious type of filter is used. Kramer has used the positively charged filter in experiments on the filtration of certain biological substances. Rabies virus, vaccine virus, *Vibrio percolans* and a staphylococcus bacteriophage, he says, are

filtrable through the ordinary kind of filter but not through the gypsum (positive-charge) filter. Hunt and Falk[6] used a gypsum filter in connection with the filtration of vaccine virus and, like Kramer, they were unable to obtain a positive filtrate (a filtrate containing the virus), but they further make note of the fact that they were also unable to filter the virus through a Berkefeld filter.

It has already been stated that hog-cholera virus will readily pass the siliceous filters but whether or not it is retained by a gypsum filter has never been reported. Experiments relative to this point have been undertaken and are recorded below.

An examination of the literature has revealed but few records of experiments in ultrafiltration with hog-cholera virus. Ultrafiltration is defined by Bechhold[1] as filtration through jelly filters. It will serve to separate colloid solutions from crystalloids and for the separation of colloid mixtures having particles of different size. The particular significance of ultrafiltration is well stated by Zinsser and Tang[23]: " . . . an endeavor to approach the problem of the magnitude of some of the so-called 'filtrable viruses' by measuring them against the permeability of graded filters made of collodion . . . ." These men also suggest that if more definite information could be obtained as to the actual size of some of the filter-passing pathogenic agents, it would mean much toward a clearer understanding of these substances. In connection with the filtration of hog-cholera virus through collodion filters, K. F. Meyer,[13] in 1912, while taking part in a duscussion on hog cholera before an assembly of the American Veterinary Medical Association, made the following statement:

> Further experiments were elaborated to demonstrate that the hog cholera virus will pass through colloid filters. . . . We noticed that by successive inoculations the virus would pass in a dilution of two to one hundred a one per cent agar colloid membrane, but not a three per cent agar, nor a collodium or celloidin membrane.

This report is of interest but it is regretted that an account setting forth the details of the investigation is not available. The filters used by Meyer were prepared by coating Berkefeld and Pukal filter candles with the respective colloid solutions and allowing them to jel. Von Betegh[2] describes two series of experiments of ultrafiltration with hog-cholera virus. In the first series heart blood from a natural-occurring case of the disease was subjected to ultrafiltration. Acetic-collodion membranes were used. In the second series, lung, liver and spleen tissues were emulsified and the mixture subjected to filtration through similar mem-

branes. The filtrates from both series were injected into susceptible swine. Three pigs were injected with the filtrate from the first series and three with filtrates from the second. None of the test pigs showed evidence of the disease. The virus was apparently retained by the membrane which indicates that it is itself a colloid or associated with colloidal substances.

The colloidal character of the virus is suggested also by Roderick and Schalk.[20] This conclusion was reached after several experiments in which the virus was placed in dialyzing bags and suspended in water, physiological salt solution, Ringer's solution, normal pig and normal horse serum. The dialysates of water, Ringer's solution and of the saline solution did not produce hog cholera when injected into susceptible pigs. The serum dialysates on the other hand caused typical hog cholera when injected into swine. As a possible explanation of the occurrence of the virus in the normal-pig and horse-serum dialysates, these authors suggest that the virus probably grew through the membranes. The bags were allowed to remain in contact with the dialysate for several days in some cases. The findings of these investigators and those of Meyer and of von Betegh create an interest for further work concerning the behavior of hog-cholera virus to semi-permeable membranes. Experiments of this kind were undertaken and are recorded in subsequent paragraphs.

Experimental

Instead of including in a separate paragraph the plans of the experiment and the methods of procedure, these will be described in the discussion of the different phases of the investigation. This arrangement seems desirable because somewhat different apparatus and equipment are employed in certain of the experiments. It is of course necessary in connection with studies on hog cholera virus to have available susceptible swine to use as test animals. In order to determine whether a specific kind of treatment has had any effect upon the pathogenicity of the causative agent or upon its existence in the medium studied, injections of the material into susceptible pigs must be made and the subsequent results observed. In the work we are reporting, a group of particularly susceptible pigs was available for all inoculation tests. The pigs when inoculated were placed in portable houses. The floor of the house was made of cement and so pitched that water or liquids would drain into a catch basin attached on the outside of the house. The cement was extended up the sides of

the walls to a height of seven inches. Three of the walls were boarded up tight from the floor to the roof and the fourth from the floor to a height of two and one-half feet. The upper part of this wall consisted of a flap or door, hinged at the top. The shape of the house is rectangular, six feet across the front and back and six feet on the sides. It was a comparatively easy matter to clean and disinfect the house thoroughly before the pigs were consigned to it. The construction and arrangement of the house made it possible for the attendant to feed, water and clean without entering it. Also the temperatures of the pigs could be taken without entering the house.

The Virus

A factor of particular importance in a study of hog-cholera virus is that of its virulence. This implies that in a standard dose (2 to 3 cc), a sufficient amount of the etiological agent is present to cause a typical case of hog cholera when injected into a susceptible pig. Accordingly, 3 cc of a defibrinated and phenolized hog-cholera virus was injected into pig 3812. This had a two-fold purpose. First, to determine the virulence and, second, to obtain a large quantity of virus. This pig was noticeably sick on the fifth day after injection and was destroyed two days later. The animal was carotid-bled and the greater portion of the blood was collected in sterile containers and allowed to clot. A smaller portion was defibrinated with glass beads, and the fibrin removed and the remainder saved. From the portion that was allowed to clot naturally the serum was removed on the following day. This was centrifuged and then bottled in brown bottles and placed in the ice-box. As a check to determine whether the blood of pig 3812 contained the virus, pig 3816 was inoculated with 2 cc of the defibrinated blood.

As a further check and since we were particularly interested in the serum portion of the blood, pig 3813 was injected intramuscularly with 2 cc of the blood serum of pig 3812. Both pigs (3813 and 3816) developed typical hog cholera. This passage of the virus was further checked by inoculating pig 3819 with 2 cc of the blood serum of pig 3816. Eleven days from the time of injection, pig 3819 was destroyed and the autopsy showed characteristic lesions of hog cholera. A dilution of 1 to 200 in physiological salt solution was made with blood-serum virus of pig 3827 and then injected into pigs 3837 and 3838. Three cubic centimeters of the diluted virus was injected into each of them.

The course of the disease was more protracted than is the case with most artificially infected swine but the postmortem findings were typical of the disease. This injection served as a check on the dilution of the virus (similar dilution used in certain filtration experiments) and also in the virulence of the virus. The injections in this case represented the fourth passage of the virus while under our control.

Experiments with Siliceous Filters

The filtration experiments with diatomaceous and porcelain filters were conducted principally as a check on the filtrability of the virus. The passage of hog-cholera virus through filters of this kind has been known for about 25 years and has been demonstrated many times. However, unless it could be demonstrated that the virus we were using would pass a Mandler or Chamberland filter possessing an electro-negative charge, the experiments with electro-positively charged filters could not be directly compared. With this idea in mind, 25 cc of virus serum was diluted with 75 cc of physiological salt solution and passed through a new Mandler filter. Eighty cubic centimeters was delivered by the filter in 15 minutes, with a vacuum of 350 mm., as indicated by a mercury manometer. Portions of the filtrate were injected into two pigs (3817 and 3818). The injections were made intramuscularly, each pig receiving 5 cc. Both sickened and were destroyed, and the postmortem findings showed lesions characteristic of hog cholera.

Another portion of the virus, diluted as above, was passed through a Chamberland B filter and the filtrate injected into susceptible pigs. The filtration time for 100 cc in this case was 17 minutes, using a vacuum of 350 mm., as in the case of the Mandler filter. The pigs inoculated with this filtrate developed hog cholera. Both filters were tested with a 36-hour broth culture of *Serratia marcesens*, using a vacuum of 350 mm., and in each case the filtrates were sterile. A solution of Congo red, one part in 20,000 parts of water, was passed through both filters and both delivered a red-colored fluid, indicating the filters were negatively charged. These experiments proved to our satisfaction that the virus being used was filtrable.

Experiments with Gypsum Filters*

In the first experiment with this kind of filter, 25 cc of virus serum from pig 3812 was diluted with 75 cc of physiological salt

*These filters were furnished us by Dr. S. P. Kramer, of the Hygienic Laboratory, Washington, D. C., to whom we are greatly indebted.

solution and subjected to filtration. The time of filtration for 80 cc at a vacuum of 350 mm., was 27 minutes. Portions of the filtrate were injected intramuscularly into each pig. On the fifth day after injection, pig 3814 refused its feed and began to show evidence of weakness. The following day it remained in its bed, was very weak, refused feed and showed a conjunctivitis. Its temperature on the fifth day was 104° F., dropped to 103° on the sixth day, but increased to 106.6° on the seventh and eighth days. On the eighth day it was destroyed. The lesions at postmortem were typical of hog cholera. The course of the disease and necropsy findings in the case of the second pig (3815) were similar to those just described. A broth culture of *Serratia marcesens* was filtered through this candle, with the result that the filtrate, when inoculated into suitable culture media, remained sterile. When Congo red was filtered, the fluid discharged by the filter was clear, the dye being retained in the filter. A second experiment was conducted with another new gypsum filter. One part of virus in four parts of salt solution was filtered at 360 mm. of vacuum. It required 31 minutes for the delivery of 50 cc. Two pigs were inoculated with portions of the filtrate. Pig 3823 received 4 cc and pig 3824 was given 5 cc. The course of the disease and postmortem findings were characteristic of hog cholera.

The experiment was repeated a third time, the virus being diluted as above, but a new filter was employed. Twenty-two minutes were required for the filter to discharge 20 cc, with a suction equal to that used in the previous experiments. Pigs 3830 and 3831 were injected with 3 cc of the filtrate. These pigs sickened on the fifth day after the injection but were not destroyed until the sixteenth day. The diagnosis based on the postmortem picture was hog cholera. Subsequent to the filtration of the virus, large quantities of distilled water were passed through the candle before being sterilized in the Arnold sterilizer. The candle was now tested against a broth culture of *S. marcesens* and it was found that this microorganism did not pass the filter. In the fourth experiment with the gypsum filter, the virus before filtration was more highly diluted. One cubic centimeter of the virus was diluted with 99 cc of physiological salt solution. The time for the passage of 20 cc, at 350 mm. of vacuum, was three and one-half minutes. Pigs 3839 and 3840 were injected with the filtrate, each receiving 5 cc (equivalent to .05 cc of undiluted virus serum). Both pigs sickened and were destroyed and the autopsy findings were typical of hog cholera.

In the following experiment a compound filter was used. This filter was constructed so that the core consisted of a Mandler filter and the cortex a mixture of calcium sulphate 75 parts and magnesium oxid 25 parts. Theoretically both negatively and positively charged particles should be removed by this filter, i. e., the negatively charged particles would be retained in the cortex and positive ones retained in the Mandler filter. A dilution of one part virus in four parts saline was prepared and subjected to filtration. In 35 minutes, at the same amount of vacuum as used in the previous experiments, 100 cc was delivered by the filter. One pig (3828) was destroyed on the sixth day after the injection. The second pig (3827) was destroyed on the eleventh day. Both were diagnosed hog cholera. This experiment was not repeated.

Through the kindness and interest of Dr. Kramer, another new type of filter was made available for further study on the filtrability of hog cholera virus. This filter, it is said, will remove both basic and acid colloid dyes from colloidal suspensions. The filter is designated as an "amphoteric" filter. A virus of proven virulence was diluted, one part virus in four parts physiological salt solution, and filtered through this candle. Forty cubic centimeters of fluid was delivered by the filter in 16 minutes, at 350 mm. of vacuum. Pig 3826 was injected with 4 cc of the filtrate and pig 3825 with 5 cc. The pigs sickened and showed clinical symptoms quite typical of hog cholera. The postmortem findings also were characteristic of this disease. This experiment was not repeated.

Experiments with Ultrafiltration

In the experiments with ultrafiltration, collodion membranes were used. These were prepared according to methods suggested by Nelson and Morgan.[15] Du Pont's parlodion, two per cent by weight, is dissolved in absolute alcohol 75 parts and ether 25 parts. This constitutes the collodion solution from which the membranes are made. Flat membranes are used. A glass plate is thoroughly cleaned, weighed, then leveled on a smooth surface. Five cubic centimeters of the solution (measured with a pipette) are spread over the plate. It is advisable to fog the plate just before running the collodion solution on it. This is done by breathing upon it. The solution spreads out into a thin film and is allowed to evaporate until the liquid changes to a gel. At this point the membrane is weighed (W_0) and subsequently immersed in water. After about 20 minutes in the water, or until the surface of the membrane is not wetted by the water, it is dried be-

tween filter papers and weighed again (W_W). The membrane is now put back in the water and left there for at least 12 to 15 hours before being used. A third weight (D), which is the dry weight of the collodion, is obtained by drying the membrane over night at 70° C. With these data the grade of the membrane is determined, which offers a basis for direct comparison between the different membranes as prepared. These authors say:

> From these data, G_O, the grams of solvent per gram of collodion before water immersion, and G_W, the grams of solvent per gram of collodion after water immersion, are calculated as follows:

$$G_O = \frac{W_O - D}{D}$$

$$G_W = \frac{W_W - D}{D}$$

TABLE I—*Data on membranes prepared for ultrafiltration experiments*

MEMBRANE NUMBER	AMOUNT OF SOLUTION	W_O	W_W	D	G_O	G_W
11	5 cc	2.915	1.855	.1010	27.861	17.366
12	"	2.595	1.815	.1014	24.591	16.897
13	"	2.059	1.624	.1028	19.024	14.797
14	"	2.880	1.310	.1010	27.450	11.970
15	"	2.412	1.651	.1022	22.622	15.154
16	"	2.350	1.322	.1033	21.749	11.797
17	"	2.590	1.830	.1028*	24.194†	16.801‡
18	"	2.795	1.815	.1014	26.564	16.899
19	"	2.895	1.955	.1030	37.106	17.980
20	"	2.902	2.345	.1120	24.910	19.937
21	"	2.485	2.100	.1028*	21.173†	19.428‡
22	"	3.045	2.301	.1042	28.222	21.082
23	"	2.995	2.267	.1000	29.950	21.670
24	"	2.215	1.615	.1028*	20.456†	14.710‡
25	"	2.045	1.672	.1028	18.892	15.262
26	"	2.205	1.820	.1028*	20.499†	16.704‡
27	"	2.015	1.600	.1028*	18.599†	14.564‡
28	"	2.540	1.910	.1010	24.148	17.910
29	"	2.495	2.034	.1028*	23.270†	18.786‡
30	"	3.050	2.545	.1031	28.582	23.684
31	"	2.872	1.790	.1028*	26.937†	16.412‡
32	"	2.830	1.770	.1028*	26.529†	16.217‡
33	"	3.010	2.600	.1028*	28.202†	24.296‡
34	"	2.070	1.420	.1028*	19.133†	12.813‡
35	"	2.315	1.655	.1028*	21.519†	15.099‡

*Average D of those membranes that were not used.
†G_O calculated on the basis of the average D.
‡G_W calculated on the basis of the average D.

Table I shows the W_O, W_W, D, G_O and G_W values of a number of membranes prepared in connection with the ultrafiltration experiments herein described. The values of G_O and G_W for the membranes that were used are computed on the basis of the

average D weight of the membranes not used, since D could not be obtained of any that were utilized.

The ultrafiltration apparatus consisted of two glass cylinders 2.5 cm. in diameter. One end of each cylinder was flanged. This surface was ground so that the smooth surfaces opposed and formed a tight union with the membrane between them. The cylinders were held firmly in position by two collars, consisting of pieces of wood fitted with bolts and nuts which could be drawn up tight to

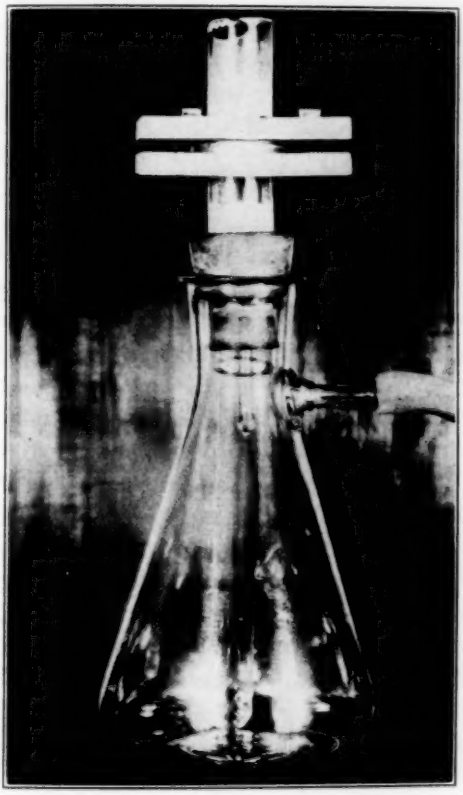

FIG. 1. The ultrafilter.

the membrane. A cork and delivery tube were fitted into the end of one of the cylinders and this was inserted into the mouth of a filtering flask (figure 1). The filtering flask was connected with a vacuum pump.

Undiluted virus serum from pig 3816 was filtered through membrane 17 (table I). The time of filtration required for 1 cc to pass through the membrane at a vacuum of 35 mm. of mercury

was four and one-half hours. The filtration was discontinued after this length of time and the filtrate (1 cc) injected into the test animal (pig 3820). The temperature of this pig, except for a period of two days, showed no particular indication of fever, but remained at a normal level for 21 days. For two days, the third and fourth days after injection, the temperature was below 99° F. At no time during the 21-day period following the injection of the filtrate did the pig show any evidence of sickness. On the twenty-first day, 3 cc of an undiluted virulent-virus serum was injected. The purpose of this injection was to determine the susceptibility of the pig. Beginning the third day after the injection of the virulent virus, the temperature began to rise and the animal refused feed and became weak and listless. This continued and the pig was destroyed five days later. The postmortem findings were characteristic of hog cholera.

Membrane 24 was used in the next experiment. Undiluted virus serum from pig 3821 was passed through the membrane. The vacuum was increased to 55 mm. of mercury in this trial but still the time required to obtain approximately 1 cc of filtrate was not materially reduced, four hours and fifteen minutes being the time required in this case. Pig 3829 was inoculated with the filtrate. On the sixth day after the injection, the temperature was 103.8° F. It was the same on the seventh day but on the eighth day it decreased to 101.4° and increased on the ninth day to 105° F. Again a sudden decrease occurred and again it increased on the ninth day to 105° F. Again a sudden decrease occurred and again it increased until on the twentieth day after inoculation it registered 106.4°. It was destroyed at this time. Lesions typical of hog cholera were observed on postmortem.

In the third experiment, membrane 27 was used. In this trial undiluted virus serum from pig 3827 was filtered. It required five hours and ten minutes at 35 mm. of vacuum to collect 1 cc of filtrate. This was injected into pig 3833. For 18 days after injection, the temperature never reached a point above 103.6°F. The temperature for the next eight days was always above this and on the twenty-fourth day it reached 106.6° F. The pig was destroyed on the twenty-sixth day and the autopsy findings were characteristic of hog cholera. Serum virus from pig 3827 was filtered through membrane 31. In three hours and forty minutes 1 cc was collected. The filtration was performed with a vacuum as in the previous trials. The filtrate was injected into pig 3841.

Another portion of the undiluted virus serum from pig 3827

was filtered through membrane 29. In this case four hours and fifteen minutes was required to obtain 1 cc of filtrate. Pig 3842 was injected with the filtrate. The reactions in both pigs subsequent to the injection were very similar and will therefore be considered together. For the first five days the temperatures of the pigs were normal, but on the sixth, seventh and eighth days rose to approximately 106.0° F. Within four days they had returned to normal and remained so for the following two weeks. During the period of hyperpyrexia, the pigs were "off feed" but did not show evidence of marked weakness or the characteristic tucking up of the flanks or diarrhea, such as are generally observed in cholera-affected swine.

Twenty-five days after the injection of the filtrate, both were inoculated with 3 cc of virulent virus serum, using in this case some of the same virus that had been used in the filtration process. Again on the sixth and seventh days after the administration of the virus, the temperature increased, showing that they were having a high fever. Food was refused and they became prostrate. This continued and they were destroyed. Both showed typical lesions of hog cholera. In the next experiment on ultrafiltration, membrane 34 was used. Approximately 2 cc of filtrate was collected in four and one-half hours at a vacuum of 35 mm. of mercury. Pig 3843 was injected with the filtrate. At the time of this writing, 22 days after the injection of the filtrate, this pig has never shown the slightest evidence of sickness and its temperature has never been above 104.° F.

To determine whether or not the virus would dialyze through a collodion membrane was the object of another experiment. For this a collodion sac was prepared from the same collodion solution used for making the membranes. Twenty-five cubic centimeters of undiluted virus serum was placed in the sac, a rubber stopper coated with collodion fitted into the open end, the sac tied firmly around the stopper and sealed with collodion and then the entire sac suspended in a flask. The flask was fitted with a stopper containing delivery and return tubes, so that water could be circulated about it continuously. The dialyzing process was continued for eight days. At the end of this time a small amount of precipitate remained in the sac. This was mixed with distilled water and injected intramuscularly into pigs 3825 and 3836. One of them (3836) sickened on the eighth day and the other on the fourteenth day. Both were destroyed on the twenty-fifth day after inoculation and both were diagnosed hog cholera at autopsy.

Summary and Discussion

An important consideration in connection with any experiments on hog-cholera virus is the fact that the only way the presence of the virus can be determined is by animal (swine) inoculation. This necessitates a supply of susceptible pigs. Care must be taken to prevent this group of pigs from becoming infected with hog cholera. This precaution was observed. The susceptible pigs were separated from the infected ones by a distance of approximately 25 rods. They were fed, watered and cared for by one attendant, the exposed pigs by another. It is also important that transmission of the infection between the various exposed animals be prevented. This too we believe was satisfactorily controlled. The inoculated pigs were kept by themselves in small houses (described elsewhere). Eight houses were available. A lapse of from four to five days occurred in nearly every instance between the removal of a sick pig from the house and the consignment of another to the same house. The houses were thoroughly cleaned and disinfected after each occupancy. Another factor of great importance is that the swine to be used for testing the virus or unknown material be free from disease. It is to be emphasized that all the pigs used for testing the various viruses were vigorous and healthy swine.

The virus which represented our original infective material, possessed a high degree of virulence. When inoculated into susceptible swine it caused typical hog cholera. The virus was given four passages in this study and portions of the blood from each passage were used in the different experiments.

Preliminary experiments with the clear-serum portion of the blood from cholera-affected pigs were conducted. The object of this was to demonstrate the existence of virulence of the etiological agent in the serum portion of the blood, since all subsequent experimentation was to be made on the blood serum. The pigs inoculated with the blood serum all developed hog cholera. Experiments on the filtrability of the virus through standard bacterial filters (Chamberland, Mandler) were also preliminary to the problem. The filtrates collected after passage through these filters produced typical hog cholera when injected into susceptible swine. The results obtained showed definitely that we were dealing with a filtrable virus. The filters were also checked against the passage of a microorganism, *S. marcesens*. The filtrates from these passages, when inoculated into nutrient broth, remained

sterile. The fact that hog-cholera virus will pass filters of this kind has been demonstrated in many previous experiments, but since tests were to be made of the filtrability of the virus through a new kind of filter, it was deemed advisable to repeat the same.

Kramer and Mudd have pointed out that filters made from siliceous material (Chamberland, Berkefeld, Mandler) possess a negative electrical charge. The retention of certain substances upon passage through one of these filters is said to be the result of an electrical potential. The particles of the filter in this case, being negatively charged, attract the oppositely charged substances when passing through the pores or canaliculae of the filter. If this be the case, hog-cholera virus which is known to pass these filters readily, evidently is electro-negatively charged. Kramer[8,10] has prepared a filter which he says is positively charged. It is composed of commercial plaster of Paris and magnesium oxid. The plaster of Paris of commerce is used because of its content of calcium carbonate, since it is this element that possesses the charge. The efficiency of the filter is increased by the addition of the magnesium oxid.

By filtering diphtheria toxin through gypsum filters, Kramer[10] notes that the fraction of the toxin responsible for acute death and nervous symptoms, when injected into guinea pigs, is removed by this filter. Tuberculin that was lethal to tuberculous guinea pigs, after filtration through a Berkefeld filter, was no longer lethal when passed through a plaster of Paris filter. Botulinus toxin was innocuous after passing through one of these filters and rabies virus and vaccine virus will not pass them, according to this author. These findings aroused our interest in the effect of similar filtration of hog-cholera virus. Assuming that because hog cholera virus passes a negatively charged filter, it possesses a similar charge, it might be expected that by filtering it through a positively charged filter, the virus would be retained. The filtrates in this case should not be infective.

Experiments were undertaken to determine what effect the filtration through a plaster of Paris-magnesium oxid filter would have on the infectiousness of hog cholera virus. Four different filters of this particular kind were used. A virulent virus diluted with physiological salt solution in the proportion of one part virus to four parts saline was filtered through three of these filters. The filtration in the fourth instance was made with a 1-100 dilution of the virus. Duplicate inoculations were made with portions of the filtrate from each filter, i. e., two pigs were injected with por-

tions of the filtrate from the first filter, two from the second, and so on. All inoculated pigs sickened. All were destroyed after a suitable length of time and postmortem examinations were made. The lesions in every case were characteristic of those found in hog cholera.

The results of the experiments indicate that the virus of hog cholera does not carry a charge. In other words, it is neutral. The dispersion medium in all of the experiments was the same, i. e., blood serum diluted with physiological salt solution. The proportions of the virus serum and the dilutant were alike in all but one of the trials. In the case of the higher dilution (1:100) it is supposed that a greater dispersion of the virus occurred. This being the case, it would seem that a greater opportunity was afforded for the adsorption of the virus by the filter. This, however, did not occur, or at least did not occur to the extent that all of the virus was retained in the filter, since a sufficient amount passed through so that pigs inoculated with the filtrate developed cholera. Whether the virus would have been retained in case still higher dilutions were passed is not known. This raises the question of the minimum lethal dose of hog-cholera virus. It has been shown that quantities as small as .00002 cc[20] and .00003 cc[11] of virus were lethal to susceptible swine. The number of such tests is, however, too small to be of practical significance and therefore we considered it advisable to conduct our experiments with virus in concentrations and doses of proven amounts.

The passage of hog-cholera virus through collodion membranes was studied. The membranes used in these studies were flat, thin membranes prepared from alcohol-ether solutions of parlodion. A certain amount of the collodion solution was spread out on a glass plate and when it reached the gel stage it was immersed in water. This removed the solvent. The membranes at different stages in their preparation were weighed and with this data calculations can be made which afford a certain basis of comparison of them. When the filter was set up for use, the membrane was supported between two glass cylinders arranged to form a tight union between the cylinder and the membrane. The diameter of the cylinder being 2.5 cm., the area of the filter surface was not very great and it was not necessary to support the membrane by wire gauze. With care, a vacuum of 85 mm. of mercury could be produced without rupturing the membrane. This amount of vacuum, however, was never used in any of the experiments on the virus. Six different membranes were used.

In every case the material filtered consisted of undiluted clear blood serum which had been satisfactorily demonstrated to contain the causative agent of hog cholera. From 3 to 5 cc of the serum was placed in the cylinder. The ultrafilter and flask were shaken gently several times during the process of filtration to agitate the serum. The filtrate was collected in a sterile test-tube within the filtering flask. This was injected into the test pigs soon after the filtration was terminated. The results of the injections of the filtrates show that the virus passed membranes 24 and 27, because the pigs receiving the filtrates from them both developed cholera. In these cases, however, the lapse of time between the injection of the filtrate and the first definite evidence of disease was longer than usual in the case of artificially infected pigs. The filtrates obtained after passage through membranes 31 and 34, when injected into suceptible pigs, produced interesting results. First, the pigs sickened showing symptoms of pyrexia and anorexia, beginning about the sixth day and continuing four days. The temperature curve for this period was quite typical of that occurring in hog cholera. However, by the twelfth day after the inoculation, both pigs had fully recovered and remained healthy until they were later injected with a virulent virus. This injection caused them to become very sick and, when destroyed, the lesions found were those of hog cholera. It would appear in these cases that the filtrate contained some of the virus.

Unfortunately we cannot approximate the amount of virus it contained but it was probably only a very small quantity. Our reasons for believing the filtrate contained virus are based on the clinical syndrome appearing subsequent to its administration. That there was only a small quantity present is evidenced by the fact that the animal's natural defenses overcame the infection which was followed by recovery, but the infection was not intense enough to cause the production of a solid immunity. That they were not immune is proven by the fact that both developed typical hog cholera after being inoculated with virulent virus. The filtrates obtained after the passage of a virulent virus through membranes 17 and 29 did not produce cholera when inoculated into susceptible swine. This confirms the report of von Betegh, that the virus of cholera does not pass a collodion membrane. The membranes von Betegh used were not, however, the same as were used in these experiments.

Zinsser and Tang[23] note the passage of the Rous sarcoma virus and herpes virus through 1½ per cent acetic-collodion mem-

branes. We attempted to filter a one per cent solution of collargol through several different membranes (membranes having been prepared as in the case of the virus filtration tests) but it did not pass the membrane. Bechhold gives the size of the collargol molecule as 35 millimicrons. The pores then of the membranes used by us were probably less than 35 $\mu\mu$ in size and since the virus occurred in some of the filtrates, it would be concluded that the virus, either as a single particular substance or in aggregations of two or more particles, is less than 35 $\mu\mu$ in size.

Only one experiment on the effect of dialysis on hog cholera virus was conducted. The dialyzing sac consisted of a collodion sac made from the same solution used for making the membranes. Twenty-five cubic centimeters of a virulent virus was dialyzed in running water for eight days and the precipitate inoculated into test pigs. The inoculated pigs sickened and when destroyed showed the characteristic lesions of cholera. The retention of the virus by the dialyzing membrane, when the dialysis was performed in water, is also reported by Roderick and Schalk.

Conclusions

1. Hog-cholera virus is not retained by the plaster of Paris-magnesium oxid (electro-positive charged) filters of Kramer.

2. The virus passed the ultrafilter when two per cent collodion membranes were used.

3. It would seem that the size of the virus of hog cholera is less than 35 $\mu\mu$.

4. The precipitate remaining after virus serum was dialyzed in running water for eight days produced hog cholera, when injected into susceptible pigs.

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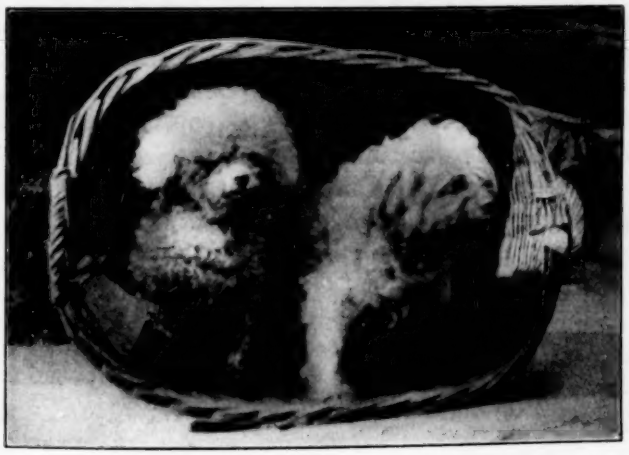
Poster Shows Control of Fluke

A poster dealing with the common sheep liver fluke has been issued by the Bureau of Animal Industry, U. S. Department of Agriculture, to enlist the aid of owners of live stock in checking the spread of the parasite. The poster describes and illustrates the life cycle of the fluke and outlines simple methods of control. Since young flukes spend a part of their life history in the snail, it is especially important to drain, fill, or fence off wet areas in which snails breed. Snails may also be destroyed by the application of copper sulphate, as a spray or powder, to infested pastures.

Besides killing many sheep and cattle annually, flukes cause an annual loss of fully $300,000 because of damage to livers as a food commodity. These parasites, sometimes incorrectly called leeches, are spreading from the West Coast, Rocky Mountain States, and South toward the East and North.

Copies of the poster may be obtained on request to the U. S. Department of Agriculture, Washington, D. C.



A contented pair.

SOME OF THE RARER AND MORE NEGLECTED PARASITES OF DOGS AND CATS*

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Parasitic diseases of the dog probably rank second in importance to but one infectious disease, canine distemper being regarded as the most destructive disease of this animal. In recent years parasitic diseases have been given more or less serious consideration and treatment of these diseases now constitutes about 50 per cent of the practice of many veterinarians. Many breeders of dogs have been forced out of business in past years on account of ascarids and hookworms alone, and in some sections of the South it is difficult to raise hunting dogs that are free from infestation with *Dirofilaria immitis*, a nematode occurring in the heart, which renders the animal practically worthless for hunting purposes.

Dogs and cats are subject to infestation with a large variety of parasites, about 300 species of various sorts having been reported from the dog and about 175 species from the cat. Some of these parasites are not known to occur in this country and others are usually considered rare and unimportant. It is probably unwise, however, to regard any parasite as unimportant since there is much that is yet unknown about even the most common species.

The object of this paper is to call the attention of small-animal practitioners to a few of the more important of the rarer internal parasites which infest the dog and cat in this country, and which may be found to occur much more frequently than is known to be the case at the present time. For the most part these species are distinctly pathogenic and give rise to symptoms which are often confusing, and which in some cases may be mistaken for other diseases, such as distemper and rabies.

TREMATODA

Of the numerous species of flukes which have been reported from dogs and cats in the United States, two species, *Paragonimus kellicotti* and *Nanophyetus salmincola*, are of special interest.

*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.

The first of these species is identical with or very similar to a fluke which infests man in the Orient, producing a disease, pulmonary distomiasis, which clinically resembles tuberculosis; the second species occurs in dogs and other carnivores, in parts of Oregon, Washington and California, and produces a disease, frequently fatal, known as salmon poisoning.

Paragonimus kellicotti: This trematode, commonly known as the lung fluke, is thick, oval or elongate pyriform in shape, the anterior half of the body being thicker than the posterior half. On cross section the worm is nearly circular, the ventral surface being somewhat flattened. Mature specimens are from 3 to 14 mm. long by 2 to 6 mm. wide and 3.5 to 5 mm. thick. The eggs are light brown in color, 78 to 96μ long by 48 to 60μ wide, and provided with an operculum or cap at one pole.

The life history of the lung fluke as determined by Japanese investigators involves two intermediate hosts. The eggs hatch under the most favorable conditions in about sixteen days and the liberated miracidia enter snails of the genera *Melania* and *Ampullaria*, and develop into cercariae. When the cercariae escape from the snail they enter fresh-water crabs of the genera *Potomon*, *Sesarma*, *Eriocheir*, and *Pseudothelphusa*, and also enter crayfish of the genus *Astacus*. In these hosts the cercariae become encysted in the gills, muscles, hypodermis and liver. The process of encystment requires about thirty days and the cysts may remain alive for as long as six years. Cysts may be released from injured crabs and remain alive in water for as long as three weeks. When swallowed by a suitable host, the young flukes are liberated from the cysts and pierce the intestinal walls, enter the abdominal cavity, migrate to the thoracic cavity through the diaphragm, and finally enter the lung where they encyst and develop to maturity. Occasionally specimens may wander to the brain, spinal canal, and other organs and become encysted.

The presence of these flukes in the lung causes a localized inflammation, hemorrhage, and cyst formation. The cysts appear as dark red, slightly elevated areas, and contain, in addition to the flukes, a dark brown semifluid mass composed of broken down lung tissue, blood, and eggs of the parasite. The adjacent bronchioles are congested and this congestion, together with the escape of eggs and other material, gives rise to a cough. In man a common symptom is the coughing of blood, but in

animals this would probably not be noted. Diagnosis is usually made postmortem.

P. kellicotti has been reported from the dog in Ohio and California, and recently specimens were received by the Bureau of Animal Industry which had been collected from a dog at Garrett, Indiana, by Dr. F. A. Hall. It has been reported from cats in California, Louisiana, Michigan, Minnesota, Missouri, West Virginia and Wisconsin. It is found occasionally in swine in meat inspection at various points and appears to be found most often in swine slaughtered at the Cincinnati abbatoirs.

P. kellicotti resembles *P. westermanii* from the tiger and *P. ringeri* from man so closely that there is some doubt as to their validity as distinct species. Ward and Hirsch (1915) differentiate these forms on the basis of the morphology and distribution of the cuticular spines, but other authors are of the opinion that the species are identical. In view of the fact that pulmonary distomiasis has not been reported from man in this country, although lung flukes are frequently found in swine, it would appear that the species are distinct, at least from a physiological standpoint. This point needs further investigation.

Nanophyetus salmincola: This species is one of the smallest of the trematodes occurring in carnivores. Mature specimens are about 500μ long by 280μ wide, oval in outline, and white or yellowish white in color. The eggs are brownish, oval, 75 to 85μ long by 55μ wide, and provided with an operculum at one end.

According to Donham (1928), this species has as its first intermediate host a snail, *Goniobasis plicifera* var. *silicula* (Gould). The second intermediate hosts are trout or salmon of the genera *Salmo, Salvelinus,* and *Onchorynchus.* The young flukes, or metacercariae, occur in the kidney and muscles most frequently, but are also found in the gills, liver, and wall of the digestive tract. The metacercariae occur in minute cysts which are about 140μ in diameter and are barely visible to the naked eye, appearing as minute white spots. Upon being ingested by carnivores, the young fluke is liberated from the cyst and develops to maturity in the mucous membrane of the small intestine in from seven to ten days. The eggs are passed out in the feces and develop in water. The time required for hatching has been determined by the writer to be about three months at room temperature.

This trematode is apparently the most pathogenic of all flukes, the disease produced by it, salmon poisoning, having a symp-

tomatology similar to that of some forms of canine distemper. According to Donham, Simms and Miller (1926), the onset of the disease is very sudden and is accompanied by a temperature of 105 to 107° F. There is a marked depression, loss of appetite, increased thirst, and in some cases a discharge of pus from the eyes. Frequently there is an edematous swelling of the face, which is an important clinical symptom. After 24 to 48 hours, the temperature falls and a diarrhea develops, the feces being tinged with blood at first and later consisting of almost pure blood. Eggs are present in the feces in large numbers at this stage. As the disease progresses the animal becomes extremely weak and emaciated. In about six to eight days the temperature becomes subnormal and death occurs 24 to 48 hours later.

Prognosis is grave and in those animals which recover the period of convalescence is long. Animals which have recovered are immune to the effects of subsequent infestations.

The postmortem findings are emaciation, hemorrhagic inflammation of the intestinal tract, and the presence of flukes in the mucosa. In one case, produced experimentally by the writer, there was marked icterus in addition to the usual lesions. Histologically the intestine shows cellular infiltration and necrosis of the free ends of the villi, and flukes embedded deeply in the mucous membrane, especially that of the duodenum.

There is no satisfactory medicinal treatment. Prophylaxis consists in preventing dogs from eating infested fish.

This species is pathogenic for coyotes and foxes, producing typical symptoms of salmon poisoning in these animals. Cats may become infested but they are apparently not susceptible to the same degree as dogs.

The distribution of *N. salmincola* is apparently limited to western Oregon, northwestern California and southwestern Washington.

Cestoda

The following species of tapeworms have been selected because of their public health significance, one being commonly a parasite of man in the adult form, but also capable of developing in dogs and cats, and the other being a parasite of the dog and other carnivores, and having a larval form which has been reported frequently from man.

Diphyllobothrium latum: This tapeworm is a rare parasite of the dog in the United States, but one which may be encountered

more or less frequently in the Great Lakes Region. *D. latum* is usually a parasite of man in Europe and has become established in this country more or less recently.

This species attains a length of from 2 to 9 meters and a maximum width of 2 cm. The head is almond-shaped and provided with two slit-like suckers. There are no hooks, as in most of the other tapeworms of dogs. The genital pore opens ventrally in the median line. Segments are usually passed in chains instead of singly, as is usually the case for other carnivore tapeworms. The egg is brownish in color, 67 to 71μ long by 44 to 54μ wide, elliptical in outline, and provided with a small cap at one pole similar to that of a trematode egg.

Part of the life history, involving fish and mammal hosts, has long been known but the complete cycle was ascertained by Janicki and Rosen (1917), who found that when the egg hatched in water, the free-swimming larva or coracidium was swallowed by copepods, *Cyclops strenuus* and *Diaptomus gracilis*, penetrated the wall of the digestive tract, and developed into a procercoid in the body cavity. This procercoid has a globular appendix or cercomer which is provided with six hooks. The infested copepods are eaten by fish and the procercoid is set free, loses its cercomer and hooks, passes through the stomach wall, enters the body cavity and makes its way to the musculature or liver, and develops into a plerocercoid. When infested fish are eaten by suitable hosts the plerocercoids develop into mature tapeworms in the intestine.

Recently Essex (1927) investigated the early stages of the life history of this tapeworm in Minnesota and found that *Cyclops brevispinosus*, *C. prasinus*, and *Diaptomus oregonensis* serve as intermediate hosts. The fish which harbor the plerocercoids of *D. latum* in this country have been determined by Vergeer (1928) to be wall-eyed pike (*Stizostedeon vitreum*), sand pike (*S. canadense-griseum*), great northern pike (*Esox lucius*) and burbot (*Lota maculosa*).

The symptoms produced by this tapeworm in the dog and cat are not well known, since it occurs less often in these animals and has received less attention in them. In man fatal cases of anemia have been reported as being caused by this tapeworm. This anemia is said to occur only in those cases where the strobilus, or part of the strobilus, dies and disintegrates, and the anemia is thought to be associated with absorption of dead cestode material.

Medicinal treatment for the removal of this species is presumably the same as for other tapeworms. Prophylaxis depends upon preventing dogs and cats from eating raw or improperly cooked fish.

D. latum appears to have been collected but once in this country from dogs naturally infested. Van Es and Schalk (1916) reported one case in a dog from North Dakota, the parasite having been found on postmortem examination. The fact that this species is endemic in man in certain parts of the Great Lakes region furnishes grounds for the supposition that this tapeworm may be common in dogs and cats of this region wherever these animals are fed on, or have access to, raw fish.

Echinococcus granulosus: This is the smallest of the carnivore tapeworms, mature specimens being less than 1 cm. long. The tsrobilus consists of a head or scolex and three segments. The head is 300μ in diameter and provided with a double crown of from 28 to 50 small hooks. The first segment is square and sterile, the second is about twice as long as the first and contains fully developed reproductive organs, and the third is gravid, its length being about equal to that of the scolex plus that of the first two segments. The eggs are 32 to 36μ long by 25 to 30μ wide.

The life history is similar to that of the other taenioid tapeworms of the dog and cat. Eggs pass in the feces of the primary host and are ingested by the secondary hosts in contaminated food and water and the embryo escapes from its shell and migrates to various tissues and organs, where it develops into a hydatid. The cyst wall is laminated and encloses a delicate germinal membrane from which develop brood capsules containing a number of heads. In some instances daughter cysts may be formed from the germinal membrane and these also contain brood capsules and heads, and may even contain granddaughter cysts. According to Dévé, daughter bladders usually form by metamorphosis of the brood capsules. Diverticula in the walls may give rise to the multilocular form of hydatid, sometimes becoming very large and resembling a bunch of grapes.

This species is apparently cosmopolitan. Hydatids are of common occurrence in domesticated animals, especially in sheep in pastoral countries, but usually in swine in the United States. The adult worm appears to be quite rare in this country but this may be due to a lack of careful postmortem examinations of dogs. When present the worms are usually in large numbers and have been credited with causing symptoms simulating rabies.

The presence of large numbers of these worms in the digestive tract may cause enteritis. The larval form or hydatid may also occur in the dog, but this is rare.

E. granulosus is a particularly dangerous parasite, as the larval forms may develop in man, frequently in the lungs and liver, and such infestations are often fatal. Hydatids are also responsible for considerable financial loss, owing to condemnations of liver and other parts of food animals in meat inspection.

The adult worms may be removed by anthelmintic treatment, but it is not advisable to treat such animals owing to the danger of man becoming infested. Infested animals should be destroyed and the carcass burned or disposed of in such a way as to eliminate it as a source of infection. Prophylaxis is best accomplished by destroying all infested livers or other viscera of food animals, and by eliminating stray dogs which may harbor the parasite.

Nematoda

The round worms are the most commonly injurious of the internal parasites. They occur in a variety of locations and produce symptoms which are often mistaken for other conditions. The following species are considered to be the most important of the rarer nematodes which occur in dogs and cats in this country.

Dirofilaria immitis: This worm occurs in the right ventricle and pulmonary artery of the dog and related carnivores, and has also been reported from the cat. The male is shorter than the female, 12 to 18 cm. long by 700 to 900μ wide; the tail is slender and spirally curved, alate, and provided with 12 pairs of papillae; the spicules are unequal. The female is from 25 to 35 cm. long by 1 to 1.3 mm. wide; the tail is short and blunt; the vulva is situated about 2 mm. from the anterior end of the body. The eggs hatch in the uterus and the larvae are deposited directly in the blood stream. The larvae or microfilariae are 285 to 295μ long by 5μ wide, and have a long, slender, pointed tail.

The life history involves mosquitoes of the genera *Culex*, *Anopheles*, *Myzorhynchus*, and *Aedes*, and one author reports that the dog flea (*Ctenocephalus canis*) and the cat flea (*C. felis*) may also serve as intermediate hosts. The larvae are more generally present in the peripheral circulation at night, this habit being associated with the night-feeding habits of the mosquitoes. When a mosquito sucks blood from an infested dog, the larvae are taken into the digestive tract, pass through the walls of the stomach, and usually invade the Malpighian tubules and develop

there. Later, they escape into the body cavity, make their way to the mouth parts, escape by breaking through the walls of the labium, and then enter the wounded skin of the dog.

Infestation occurs most frequently in hunting dogs, especially the short-haired breeds. In the South, *D. immitis* is very common. The writer has been informed by one veterinarian that he found about 80 per cent of dogs examined at Beaumont, Texas, to be infested. Cases of infestation are occasionally found in the northern states, but in most instances the history shows that the animal had at some time been in the South. A few cases have been reported in cats, but apparently only one such case has been found in this country.

The symptoms produced by the presence of these worms in the heart vary considerably. In hunting dogs the first symptom usually noted is that the animal tires easily; the dog may gasp, breathe heavily, and collapse.

In cases of long standing, ascites and edema are common symptoms. A cough may be present, due to disturbances of the pulmonary circulation. Nervous symptoms such as fixity of vision, photophobia, convulsions, and rabiform symptoms have been reported. Japanese investigators have reported skin lesions resembling elephantiasis, but this condition has not been observed in this country. Death may result from asphyxia, embolism, and dilatation of the heart. Diagnosis should be based upon finding the larvae in the blood.

There is no satisfactory treatment. If the animal is valuable, it may be used for breeding purposes, but otherwise it should be destroyed. Prophylaxis depends upon preventing dogs from becoming bitten by mosquitoes. Dogs should be kept away from places frequented by mosquitoes, especially after sundown and in the early morning. Excellent protection may be afforded by keeping the animals at night in mosquito-proof kennels with self-closing doors, a thing which was first tested out in the Fiji Islands. In Hawaii it has been found that long-haired dogs are less readily infected than short-haired dogs and have a longer life of useful service in the hunting field.

Spirocerca sanguinolenta: This species occurs in tumors of the esophagus, stomach and, occasionally, the aorta of dogs. The worms are blood-red in color and usually closely coiled. The male is 3 to 5 cm. long. The posterior end is obtuse and spiral, and provided with lateral alae supported by 6 pairs of stalked papillae. The spicules are unequal, one 2.5 mm. long and the

other 475 to 750μ long. The female is 6 to 8 cm. long and 1.15 to 1.5 cm. wide. The tail is obtuse, slightly recurved, and provided with a pair of papillae which are almost terminal. The eggs are oval, 30 to 37.5μ long by 11 to 15μ wide, thick-shelled, and contain an embryo when deposited.

The life history involves intermediate stages in coprophagous beetles. The eggs are swallowed by the arthropods and hatch in the intestine. The liberated larvae pass through the intestinal wall to the body cavity, encyst, and develop after two months to the infective stage. When these infested beetles are eaten by dogs, the larval worms are set free and make their way to the site of infestation, where they penetrate into the tissue and develop into sexually mature worms.

The usual location is the wall of the thoracic portion of the esophagus where the worms occur in tumors. The tumors vary in size from that of a small walnut to that of an egg, and have one or more openings into the lumen of the esophagus. They are more rarely found in the wall of the stomach, and have been reported as occurring in the aorta.

The effects of this nematode upon the host depend largely upon the size and location of the tumors. Large tumors in the thoracic cavity may exert pressure upon parts of the respiratory system and induce a cough and dyspnoea, or they may interfere with circulation by pressure upon important blood-vessels. Rupture of these tumors may give rise to a fatal pleurisy. Tumors of the aorta may cause stenosis, aneurysmal formations, and rupture. Very consistent lesions observed in the aorta in cases in Texas were multiple aneurysms, atheromatosis, scarring and calcification. These lesions were not associated with worm tumors of the aorta, but were probably the result of larval migrations.

There is no constant symptomatology. The presence of tumors of the esophagus or stomach may give rise to stenosis, perforation, dysphagia, vomiting, loss of weight, and pleurisy. In the circulatory system they may cause angina, dyspnoea, suffocation, syncope and hemorrhage. Nervous symptoms simulating the early symptoms of rabies have been reported. Diagnosis depends upon finding the eggs in the feces. Prognosis is unfavorable.

There is no known medicinal treatment. Palliative treatment to relieve cough and vomiting is indicated. Prophylaxis consists in preventing dogs from eating beetles by keeping them under

sanitary conditions and using screened enclosures capable of excluding the beetle hosts.

This parasite is probably more common than published reports indicate, its location being such as rarely to attract attention. Cases have been reported from New York, Alabama, Georgia, Oklahoma, North Dakota, District of Columbia, and Texas. At College Station, Texas, this species appears to be especially common, but this apparent frequency may be due to the fact that the majority of dogs dying there are carefully examined after death and special attention paid to parasites.

Dioctophyme renale: This is the giant of the nematode world. The male is from 14 to 40 cm. long by 4 to 6 mm. wide, red in color, and provided with a bell-shaped bursa at the posterior end. The female is from 20 to 100 cm. long by 5 to 12 mm. wide. The eggs are 64 to 68μ long by 40 to 44μ wide, and oval, and the shell is marked with numerous round or oval pits or depressions.

The life history is not completely known. Ciurea (1921) discovered larvae of a nematode in the muscle of a fish (*Idus idus*) which he believed to be the young form of *D. renale*. A dog fed with these infested fish developed a female of this species in four to five months.

This worm is usually reported from the kidney of the dog in Europe but in the large majority of cases in the United States it is in the body cavity. The presence of this worm in the kidney causes pressure atrophy of the renal tissue with complete loss of function of the organ. Usually only one kidney is infested, the other showing a marked compensatory hypertrophy. When the parasite is found in the abdominal cavity there are lesions of chronic peritonitis and the omentum may show a granular condition resulting from the worm eggs picked up and held by it.

The symptomatology is not well known. Some cases show dullness, incoordination of movement, and a hoarse bark. Nervous symptoms simulating rabies have been noted. Sometimes infested animals show evidence of abdominal pain, and die suddenly following exertion. Diagnosis during life depends upon finding eggs in the urine, but this is only of value in cases where the worm is located in the kidney. In cases of abdominal infestation, an exploratory laparotomy would reveal the presence of the worm.

There is no known treatment of value in removing these parasites. If a diagnosis can be made, the worms may be removed

surgically. Prophylaxis apparently depends upon keeping dogs from eating raw or improperly cooked fish.

D. renale has been reported a number of times in this country. Hall (1923) notes that about 70 cases had been reported up to that time. The parasite is no doubt more common than published reports indicate.

Oslerus osleri: This worm occurs in tumors of the mucous membrane of the bronchi and trachea, and more rarely in small nodules in the pulmonary parenchyma. The male is very small, measuring 5 mm. in length and being very slender. The posterior extremity is rounded and bears two fleshy papillae near the cloacal aperture. The spicules are short and slightly unequal. The female is 9 to 15 mm. long and much more robust than the male. The anterior end is simple and the posterior end blunt, and shows a slightly subterminal depression within which are located the vulval and anal apertures, these openings being about 20μ apart. This species is ovoviviparous, the eggs hatching in the uterus before they are deposited. The larvae are blunt anteriorly and have a short S-shaped tail.

Nothing is known of the life history beyond the fact that the larvae pass up the trachea and are either coughed out, or are swallowed and passed out in the feces. As this species has close affinities with the metastrongyles, it is probable that the life history is direct, but the life histories of metastrongyles are too little known to make this probability very strong.

The presence of these parasites in the mucosa causes a proliferation of connective tissue and the formation of small tumors. These tumors vary in size from that of a small pea to that of a hazel-nut or larger. They are usually located at the base of the primary bronchi, but may occur also in the trachea and in the lung tissue. They are grayish in color and have a villous appearance due to the projecting ends of the worms.

The symptoms depend upon the degree of infestation and the size of the tumors. If infestation is light and the tumors small, there may be no symptoms or at most only a slight cough. As the tumors increase in size, the caliber of the respiratory tubes is decreased, respiration becomes labored and coughing is more or less persistent. Emaciation and loss of appetite are noted as the disease progresses. The condition is chronic and may terminate in death.

Diagnosis may be made by bronchoscopic examination, or by finding larvae in mucus obtained by swabbing the back part of the pharynx, and in the feces.

Treatment is unsatisfactory owing to the location of the parasites. Expectorants and cough remedies may be used as palliatives. Strict sanitation to prevent spread of the infection to other animals is recommended.

There are very few records of the occurrence of this species. It was first observed by Osler (1877) in Canada, who attributed a number of deaths in dogs to this parasite. It has been observed in Germany by Blumberg (1882) and by Rabe (1883). Milks (1916) reported three cases of infestation with this parasite at Ithaca, New York, these being the first cases to be observed in this country. In 1924, Dr. A. A. Lenert and the writer observed one case in a dog at the clinic of the School of Veterinary Medicine of the A. and M. College of Texas, and in 1925 an additional case was found in a coyote at the college zoo. The occurrence of this parasite in coyotes, together with its apparent rarity in the dog, suggests that it probably is not a normal parasite of the dog, and that the usual host is a wild carnivore such as the wolf or coyote.

Ancylostoma braziliense: This hookworm of the dog and cat is very similar in appearance to the common dog hookworm, *A. caninum*, but is slightly smaller and more slender. The male is 7.5 mm. long by 220μ wide and the female 8.5 mm. long by 350μ wide. The eggs are 65μ long by 32μ wide, and similar in appearance to other hookworm eggs. This species is easily differentiated from *A. caninum* by microscopic examination of the buccal capsule, *A. braziliense* having a large triangular tooth on each side of the oral opening dorsally and a smaller tooth on each side ventrally, while in *A. caninum* the buccal capsule is armed with three strong teeth on each side.

The life history is similar to that of *A. caninum*. The eggs hatch in the soil and the larvae molt twice, and become infective. The larvae are taken into the body by the mouth or penetrate the skin and eventually reach the intestine where they become sexually mature.

This species produces symptoms and lesions similar to those observed in infestations with other hookworms, and the same treatment and prophylactic measures are indicated.

A. braziliense was first reported in the United States by the writer (1926) from a Texas dog, and cases have since been reported from Florida and other parts of the South.

This species is of special importance since it has been shown by White and Dove (1927) that the larva of this worm is the cause of creeping eruption in man, a disease reported by Kirby-Smith, Dove and White (1926) as being common in the South, and caused by a larval nematode in the superficial layer of the skin. Creeping eruption in characterized by a linear, tortuous and serpiginous eruption accompanied by intense itching. Similar lesions have been observed in dogs and it is possible that some forms of dermatitis in these animals may be due to this species, or to other hookworm larvae.

The treatment found most effective for creeping eruption in man is ethyl acetate, applied by means of cotton or gauze packs which have been saturated with the drug, and held in place by a rubber bandage or adhesive tape. Ethyl acetate collodion, prepared by allowing the ether to evaporate from ordinary collodion and replacing with an equal amount of ethyl acetate, has also been found to be effective.

Eucoleus aerophilus: This capillarid is primarily a parasite of wild carnivores, especially foxes, but also occurs in the dog and cat. The male is 2.4 cm. long and the female 2.5 to 4 cm. long, and very slender. The eggs are similar to those of the dog whipworm, being oval in shape and having a plug or cap at each pole; they are yellowish-brown in color and measure 67 to 72μ in length.

The life history is probably direct, as in the case of whipworms. The eggs are coughed up and swallowed, and pass out in the feces. Under favorable conditions the eggs develop until they contain larvae, and are then infective for other animals. These infective eggs are then taken into the digestive tract through contaminated food and water. How the larvae get to the lungs from the digestive tract is unknown, but it may be assumed that they are carried there by the blood stream.

E. aerophilus occurs in the bronchi and small bronchioles where it causes a catarrhal bronchitis. In heavy infestations the bronchi may be entirely occluded by masses of worms and mucus. Infested animals are unthrifty, wheeze, and have a choking cough and nasal discharge. Eggs may be found in the feces and nasal mucus.

Medicinal treatment is of little value. Good nursing, nourishing food, and isolation of infested animals are indicated. Prophylaxis is largely a matter of cleanliness. Frequent inspection of the kennels or runs, and frequent and thorough removal of feces will materially diminish chances for reinfestation by preventing soil contamination. Spraying of infective runs with strong coal-tar creosote dips will probably aid in destroying infective eggs.

This species is common in foxes kept in captivity and in many places is a serious problem. It is not a common parasite of other carnivores but may be encountered in dogs and cats kept on fox ranches or in their vicinity. Chandler (1922) reported finding this species in seven out of twenty-seven cats examined in Michigan, but this appears to be the only record of the occurrence of this worm in cats in the United States.

Summary

In this paper the writer has briefly discussed a few of the more important of the so-called rare parasites of dogs and cats, which occur in the United States. Some of these parasites are probably more generally distributed than published reports indicate, but are not detected because of inadequate postmortem examinations. Others are obviously restricted to areas where suitable intermediate hosts are found.

The ten species which have been considered include the following: Trematodes (*Paragonimus kellicotti* and *Nanophyetus salmincola*), cestodes (*Diphyllobothrium latum* and *Echinococcus granulosus*), and nematodes (*Dirofilaria immitis, Spirocerca sanguinolenta, Dioctophyme renale, Oslerus osleri, Ancylostoma braziliense*, and *Eucoleus aerophilus*).

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Discussion

Dr. E. J. Frick: In the last year we had three cases in the distemper ward that died and in the postmortem of these dogs we ran across great numbers of *Taenia echinococcus*. That was an excellent opportunity for me to impress upon the students in Kansas that here was reason for revising their methods in small-animal work; that they should not use their naked fingers in making rectal examinations of small animals, but should use a rubber cap over the finger. Now very few of the students make rectal examinations with the naked finger, thus insuring added protection of not getting the infection, which is transmissible to man.

Chairman Lacroix: The suggestion is a practical one, only I would modify it by saying that you should use rubber gloves always. Is there any one else?

Dr. J. A. Allen: I have made one rather distinct observation with reference to the distribution of lungworms in foxes. For some ten years I was engaged in work in the eastern part of Canada. Recently I removed to the western part and the thing that astonished me the most was the absence of lungworms in the western part of Canada. I have had cases where we have taken heavily infested foxes from the eastern part of Canada and brought them to the western part and cleared them out completely.

Chairman Lacroix: Not long ago a misguided, but well-meaning, friend referred a client to me on the question of lungworm infestation in foxes. It

bore on the use of certain medicinal agents administered by instruments. In replying I insisted I knew nothing of it, but was inclined to believe that it was of little or no use. Can some one tell us about it?

DR. ALLEN: As far as I know, there is no mechanical means for removing lungworms from foxes. These ideas have been on the market for some time and their use may bring some temporary relief, but I do not know of any cases.

CHAIRMAN LACROIX: I think the thought here was that medicine, perhaps a nostrum, was deposited in the trachea.

DR. W. L. CHANDLER: Regarding Dr. Allen's question about lung worm eggs, they are very readily and quickly developed in the course of three weeks. Dr. K. B. Hanson has had considerable experience with the tracheal-swab treatment of lungworms and also with some of the medicine so employed.

DR. K. B. HANSON: About a year ago there was placed on the market a patented instrument known as a tracheal swab-syringe. This instrument has been sold more or less extensively for the purpose of treating foxes for lungworms. It is a combination outfit consisting of a tracheal syringe and a tracheal swab, the latter having a sponge-capped brush on its insertion-end. It possesses one good feature, this being that the bristles of the brush will ensnare and remove lungworms. Because of this, it was deemed advisable to determine the efficacy of the instrument in this respect. Since the efficacy of this kind of an instrument in the mechanical removal of worms is largely dependent upon the location of the parasites, that is, the relative number located within reach of the brush, the carcasses of fifteen foxes infested with *Capillaria aerophila*, the common lungworm of ranch-raised foxes, were examined and counts made to determine what percentage of the total number present were accessible, those in the trachea being considered accessible and those in the bronchi and bronchioles inaccessible. It was found that approximately 60 per cent of the specimens present were located in the trachea and could be considered as accessible.

This was followed by tests in which the instrument was passed on freshly killed foxes and counts made to determine the proportional number of worms removed. The findings revealed that the instrument usually removed practically all of the worms as far down the trachea as the brush was passed. Then critical and clinical tests were performed on live foxes. The results encountered thus far have been most encouraging. Many foxes manifesting apparent respiratory symptoms as a result of heavy infestation have shown marked improvement subsequent to treatment. No losses or serious sequelae as a result of treatment have been encountered.

Although about 40 per cent of the total number of *Capillaria aerophila* usually are located below the bifurcation of the trachea and out of reach of the brush, clinical tests have indicated that treatment of patients at intervals of two to three weeks results in the eventual removal of practically all of the originally inaccessible worms. Specimens of this particular species apparently tend to migrate up into the trachea from the lower air-passages of the lungs.

Tracheal brushes also have been found of value for the diagnosis of lungworm infestation in foxes. My experience has been that passing a tracheal brush and then examining it for the number of worms removed is a more dependable method than fecal examinations in the diagnosis of lungworm infestation in foxes. One objection to fecal examinations is that foxes which are heavily infested with lungworms frequently pass samples of feces devoid of lungworm eggs. This probably is due to the fact that such samples fail to contain material which has been raised from the lungs and then swallowed.

Although a medicine for killing the worms in the deeper parts of the respiratory tract is supposed to be administered by the syringe portion of the instrument, the theory being to clean up the entire infestation at one shot, I have failed to encounter a drug which shows an appreciable effect upon the worms. Five or six different preparations or drugs, claimed to be effective in the destruction of lungworms, have been tried. Without a single exception, all of them proved ineffective. My experience has been that the administration of medicines by means of the syringe portion of the instrument does no good in so far as the destruction of the worms is concerned and only tends to increase the danger of treatment. Sometime ago I discontinued the administration of drugs by means of this instrument.

THE PRESENT STATUS OF INFECTIOUS ABORTION CONTROL FROM THE LABORATORY STANDPOINT*

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It cannot be said that bovine infectious abortion is under control or that it is being subjected to intelligent and effective attempts at control except in a few isolated herds and in respect to the movement of cattle for interstate shipment into a few states. The efforts that are being made and, we may say with confidence, whatever effective efforts may be made in the immediate future are and will be more dependent upon the assistance of the laboratory than is the case with most any other infectious disease.

Diagnosis: Accurate diagnosis of Bang's disease, as well as other diseases in which abortion occurs, is possible only by laboratory tests. It is true that these tests may be made by the practitioner, but they remain laboratory procedures of a technical nature. The serum tests are the most universally practicable, and the agglutination test is the most advisable because of its simplicity and trustworthiness. Cooperative investigations by a number of veterinary research laboratories show that it is possible to get results so nearly comparable that the test cannot be condemned as erratic and dependent upon the personal factor. On the other hand, it is very easy to conduct an agglutination test in such a way that it does not give results of great value. It is also of importance to know, clinically, that the agglutinin titer of an animal's blood is not static but is a variant, fluctuating during the course of the disease in response to forces that cannot be discussed at this time.

Moreover it is well known that the presence of serum antibodies demonstrated in tests for diagnostic purposes is not necessarily an evidence of infection but may indicate immunity. Needless to say it is important to distinguish between infection and immunity in Bang's disease. It has been demonstrated that there is a marked difference in the type of agglutination reaction between the serum of an immune and that of an infected animal when the test is made by the so-called rapid method and a special antigen is used. This phenomenon is being studied most critically.

*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.

The rapid test for agglutinins is accurate and simple, but neither its accuracy nor its simplicity warrant the discarding of the test-tube method if one wishes to retain the older method. Nor is one justified in concluding that the rapid method is so simple that it is difficult to err in its use. It is best to take the position that a serum test is an experiment, the details of which cannot be safely ignored and the interpretation of which is always a matter for acutely discriminating judgment. The virtue of the rapid test lies in the fact that the reaction throughout is under the eye of the observer. The differential test for immunity and infection is an outgrowth of a study of the reaction as it occurs in the rapid test.

The laboratory is still called upon to furnish information to the clinician and the official veterinarian who requires a bacteriological study of suspected material. The isolation of *Alcaligenes abortus* from milk, bovine tissues and discharges from the fetus is possible by means of suitable media, proper environment during incubation, and a well-developed technic. There are accumulating some very useful means for differentiating the different species of Alcaligenes—the bovine, the porcine, and those of human origin—and Bruce's Malta fever bacillus. A slowly clarifying bacteriological picture of Bang's disease is developing in the laboratory. The gross and histo-pathology of this disease is being worked out, but there is little encouragement for the expectation that the pathological picture will be sufficiently specific for the purposes of differential diagnosis.

No one can realize more fully than can the laboratory worker the desirability of a reliable allergic test that can be utilized by the practitioner to make the patient yield its pathological secret. The abortin test has not proved comparable to the serum tests in accuracy. It is the problem of the laboratory to perfect a reagent for such a test.

The laboratory alone is able at the present time to tell a truthful or anything like a complete story about cattle and products of bovine origin as far as any kind of abortion disease is concerned. With Bang's disease, the story is more fully and easily told. It can be told with sufficient accuracy, facility and economy to warrant the effort prior to an attempt to control or eradicate the disease.

Treatment: We do not know of anything peculiar to this field that has been developed in the laboratory for Bang's disease or

any other kind of abortion disease. Chemotherapy and serotherapy should receive careful attention.

Control: Prevention and eradication of Bang's disease can be undertaken hopefully on the basis of our present scientific knowledge of the disease. Diagnosis is possible, but it does not have the same practical significance as does the diagnosis of tuberculosis. Bang's disease is not one of which we can blithely say, "Once a reactor, always a reactor," or, "A reaction is a death sentence." Bang's disease is one which is receiving some and should receive more official recognition, but, thank God, it is a disease that can be combated by the private practitioner in cooperation with the cattle-owner and the live stock sanitary officials without wholesale slaughter methods.

The proper procedure with each animal in a herd or with a prospective purchase should be based upon the laboratory findings, some of which were discussed under diagnosis. In cases of sterility or breeding irregularity and other conditions dependent upon Bang's disease or other kinds of abortion disease, there are other laboratory examinations that should be made, such as the examination of semen, discharges from the male or female genitals, abscesses, milk and the like. The laboratory only furnishes the data which the clinician uses in conjunction with clinical data in his efforts to make a decision relative to the disposal of a given animal. Throughout the course of the disease in a herd it is necessary to resort to laboratory findings if the decisions of the practitioner are to be intelligent.

Adequate isolation without accurate diagnosis is impossible. Quarantine without isolation is fruitless. The ultimate aim of a herd free from the microbes of Bang's disease or any other kind of abortion disease can be attained only through consistent laboratory assistance.

Specific preventive treatment based on the use of a laboratory product is theoretically possible in Bang's disease. *Alcaligenes abortus* infection acquired naturally is frequently followed by an apparently complete recovery with a freeing of the body of the pathogenic bacteria and the production of a considerable degree of immunity. There is also, sometimes, a partial recovery from the infection, i. e., the infected cow becomes free from the pathogen as far as the primary reproductive organs are concerned, but retains the germ in the udder. In these cases there appears to be an actual infection of the udder and an effective but perhaps only temporary immunity against abortion.

Among the laboratory products there are chemicals, serums, bacterins, vaccines and aggressins that have received trials. We do not know of any chemical that has proved itself helpful nor do we know of any hopeful lead in the direction of such a chemical. Serums have not proved sufficiently helpful to warrant more than a continued study of their production and application. Bacterins have almost consistently proved to be of no or only slight curative or preventive potency.

Vaccines have been used much more extensively than the available experimental data concerning their action really warrant. We do not know of any abortion vaccine now available to the cattle industry, either directly or through the veterinary profession, concerning which there are available adequate published records relative to its origin, cultural characters, pathogenicity, antigenicity, immunogenicity, and carefully checked experimental effectiveness on a sufficient number of cattle under various conditions. The manufacture of a vaccine for abortion is, as yet, a careful laboratory procedure. The use of such a vaccine is still an experiment the details of which should be carefully checked by laboratory assistance. There is sufficient evidence available on which to base the hope that vaccination against Bang's bacillus may become the chief bulwark against that pathogen. We know of no published results that indicate any possibilities along the line of aggressins or culture filtrates.

Human infectoin: An undulant fever in man occurs in all parts of the United States and in other countries. Malta fever is an undulant fever due to *Alcaligenes melitensis* and is acquired by drinking the milk of affected goats, by contact with such goats, or by laboratory infection. *A. melitensis* may affect cattle, and it is conceivable that such affected cattle might be a source of the disease in man. *A. abortus* (Bang's bacillus) of bovine origin and *A. suis* (the bacillus isolated by Good from abortion in swine, but first described by Traum and named *suis* by Huddleson) are related to *A. melitensis* morphologically, culturally, pathogenically and antigenically. *A. suis* is as different from *A. abortus* as is *A. melitensis*. Bacilli that correspond to each of these species of Alcaligenes have been isolated from humans affected with undulant fever. It is not the purpose of this paper to throw light on the problem of undulant fever in man, but it is relevant to state that the diagnosis of this disease in man is a laboratory procedure. The isolation of the pathogen and its proper identi-

any other kind of abortion disease. Chemotherapy and serotherapy should receive careful attention.

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Specific preventive treatment based on the use of a laboratory product is theoretically possible in Bang's disease. *Alcaligenes abortus* infection acquired naturally is frequently followed by an apparently complete recovery with a freeing of the body of the pathogenic bacteria and the production of a considerable degree of immunity. There is also, sometimes, a partial recovery from the infection, i. e., the infected cow becomes free from the pathogen as far as the primary reproductive organs are concerned, but retains the germ in the udder. In these cases there appears to be an actual infection of the udder and an effective but perhaps only temporary immunity against abortion.

Among the laboratory products there are chemicals, serums, bacterins, vaccines and aggressins that have received trials. We do not know of any chemical that has proved itself helpful nor do we know of any hopeful lead in the direction of such a chemical. Serums have not proved sufficiently helpful to warrant more than a continued study of their production and application. Bacterins have almost consistently proved to be of no or only slight curative or preventive potency.

Vaccines have been used much more extensively than the available experimental data concerning their action really warrant. We do not know of any abortion vaccine now available to the cattle industry, either directly or through the veterinary profession, concerning which there are available adequate published records relative to its origin, cultural characters, pathogenicity, antigenicity, immunogenicity, and carefully checked experimental effectiveness on a sufficient number of cattle under various conditions. The manufacture of a vaccine for abortion is, as yet, a careful laboratory procedure. The use of such a vaccine is still an experiment the details of which should be carefully checked by laboratory assistance. There is sufficient evidence available on which to base the hope that vaccination against Bang's bacillus may become the chief bulwark against that pathogen. We know of no published results that indicate any possibilities along the line of aggressins or culture filtrates.

Human infectoin: An undulant fever in man occurs in all parts of the United States and in other countries. Malta fever is an undulant fever due to *Alcaligenes melitensis* and is acquired by drinking the milk of affected goats, by contact with such goats, or by laboratory infection. *A. melitensis* may affect cattle, and it is conceivable that such affected cattle might be a source of the disease in man. *A. abortus* (Bang's bacillus) of bovine origin and *A. suis* (the bacillus isolated by Good from abortion in swine, but first described by Traum and named *suis* by Huddleson) are related to *A. melitensis* morphologically, culturally, pathogenically and antigenically. *A. suis* is as different from *A. abortus* as is *A. melitensis*. Bacilli that correspond to each of these species of Alcaligenes have been isolated from humans affected with undulant fever. It is not the purpose of this paper to throw light on the problem of undulant fever in man, but it is relevant to state that the diagnosis of this disease in man is a laboratory procedure. The isolation of the pathogen and its proper identi-

fication and the use of serum tests must be resorted to not only to confirm clinical suspicions but to furnish a background for an adequate epidemiological understanding of this group of diseases in man.

TO THE WIFE, MOTHER, DAUGHTER OR SISTER OF A MEMBER OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION

DO SOMETHING

Do something for somebody, somewhere,
While jogging along life's road;
Help someone to carry his burden,
And lighter will grow your load.

Do something for somebody gladly,
'Twill sweeten your every care;
In sharing the sorrows of others,
Your own are less hard to bear.

Do something for somebody, striving
To help where the way seems long;
And the homeless hearts that languish
Cheer up with a little song.

Do something for somebody always,
Whatever may be your creed—
There's nothing on earth can help you
So much as a kindly deed.

—*Selected.*

It soon will be time for the yearly dues from the members of the Women's Auxiliary to the A. V. M. A. and before then we would like to make another appeal for more members.

This organization has been in existence since 1917 and through the faithful and untiring efforts of the ones who have served as its officers, we have been able, in a measure, to accomplish a few of the many things we set out to do.

It is woman's prerogative to be the helpmate and assist, instead of taking the lead. In this we as members of the Auxiliary can be ever ready to assist when called upon, and we need every wife, mother, daughter and sister of the A. V. M. A. members to help us carry on and make the veterinary profession worthy of our best efforts.

Don't wait for a special invitation, but send your name and address to Mrs. S. E. Hershey, 1109 Washington St., Charleston, West Virginia, not forgetting the initial dues of one dollar and fifty cents, thereafter one dollar per year, and I feel sure you will not only enjoy the meetings but feel happy to do something for somebody, somewhere.

MRS. T. H. FERGUSON.

RESULTS FROM THE USE OF HUDDLESON'S VACCINE FOR BANG'S DISEASE*

By WARD GILTNER *and* I. F. HUDDLESON,
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L. T. CLARK *and* A. S. SCHLINGMAN,
Parke, Davis & Company, Detroit, Michigan

INTRODUCTION

The possibility of immunizing cattle against Bang's abortion disease has been a subject of investigation at the Michigan Agricultural Experiment Station for a number of years. We have been encouraged in the continuation of this work by the evidence obtained from our study of the natural course of the disease in infected herds. In this study, we are constantly faced with evidence that animals recover from the abortion disease and these recovered animals possess immunity against subsequent infection. Again, there is also considerable evidence that heifers after having been exposed to infection during the nursing period or calfhood, possess considerable resistance to the disease during the first pregnancy.

In view of the fact that active immunity often can be acquired against Bang's abortion disease through the process of infection, it would seem logical to assume that an active immunity could also be produced artificially if the correct procedure for this purpose were employed.

The discovery, in 1920, of a strain of *Brucella abortus* that proved to be harmless to guinea pigs through injection or feeding, led one of us (Huddleson) to study its effect on cattle and to determine the possibility of using it as an agent in producing active immunity against *Br. abortus* infection. This strain was isolated from an aborted bovine fetus from a herd affected with the disease.

It was found that a single injection of five hundred million living organisms of this particular strain would protect guinea pigs against the oral route of infection and that the immunity would persist to a high degree for about six months.

Preliminary experiments on cattle indicated that large doses of this strain could be administered subcutaneously and intra-

*Presented at the sixty-fifth annual meeting of the American Veterinary Medical Association, Minneapolis, Minn., August 7-10, 1928.

venously without harmful results or the establishment of infection in the tissues of their bodies.

Experiments were then begun, in our experiment herd and in the field, to determine the possibility of protecting cattle against Bang's abortion disease.

The well-controlled experiments on the experiment animals demonstrated that protection could be obtained against both natural and artificial infection by oral routes.

First Series

The first series of field experiments on five herds is summarized in table I. In the herds were a total of 133 animals, of which 118 were treated and 15 were left untreated. Most of the untreated ones reacted to the agglutination test and were considered infected at this time. Limited studies on our experiment animals indicated that the treatment had no beneficial effect on the infection once it was established. This group of animals was injected first with a phenol-killed suspension of the organism and seven days later with one hundred billion living organisms of the avirulent strain. In later experiments the preliminary injection of killed organisms was discontinued, as it appeared to have no value over a single injection of living organisms.

Table I—*Summary of results of first series of field experiments with the living vaccine in five herds (1920-24)*

Total Number Animals	Time Observed After Treating	Abortions	Percentage
Treated 118	1st 14 months	2	1.6
Treated 89	2nd 14 months	0	0.0
Untreated 15	1st 14 months	6	40.0
Untreated 16	2nd 14 months	3	18.7

The breeding records of 118 of the treated animals at the end of 14 months show that five animals aborted. There were no abortions recorded in the 89 observed during a second 14-month period.

The breeding data on the untreated animals are sufficient proof that the treated animals had ample opportunity to become infected during the three-year period. There were six abortions in the 15 untreated animals during the first 14-month period. Several new animals were added to the untreated lot during the second 14 months, bringing the total up to 16. There were three abortions in this lot.

Second Series

The second series of field experiments with the vaccine covers the period between 1924 and 1927. A summary of the results on animals in 10 of 23 herds is presented in table II. It was impossible to obtain breeding records in 13 of the herds, consequently it was desirable to omit them from the report of the experiment. There was a total of 327 animals in the 10 herds at the beginning of the experiment, of which 175 were given one dose of the vaccine. The remaining 152 reacted to the agglutination test in a dilution of 1-25 or higher. During the first year after treatment 7 (4 per cent) of the treated animals aborted. Of these, 108 in number, that remained in the herd during the second year after being treated, only one (0.9 per cent) aborted. During the two-year period only 5 of the treated ones were sold because of breeding trouble.

Table II—*Summary of results of second series of field experiments with the living vaccine in ten herds (1924-27)*

Total Number Animals	Time Observed After Treating	Abortions	Percentage
Treated 175	1st 12 months	7	4.0
Treated 108	2nd 12 months	1	0.9
Untreated 152	1st 12 months	37	24.3
Untreated 61	2nd 12 months	6	9.8

In the 152 untreated animals, there occurred 37 (24 per cent) abortions during the first year. Of the 61 that remained in the herds during the second year, 6 (9.8 per cent) aborted. A total of 38 animals in this group were sold because of breeding trouble.

It is of interest to note that the loss on account of animals affected with breeding trouble in the untreated group nearly equals the loss from abortions. This evidence substantiates what many workers have long emphasized, and that is that permanently infected animals are unprofitable.

It was not possible to determine the cause of the seven abortions in the treated animals, as the herds were situated at too great a distance from the laboratory. We did, however, succeed in procuring milk samples from lactating animals in three of the herds, for serological and bacteriological examination, approximately one year after treatment. *Br. abortus* was recovered from the milk of several of the untreated animals but not from a single treated one.

In a disease of the nature of Bang's abortion disease, in which the characteristic symptom may not be in evidence, it is necessary to know or have some specific evidence that supposedly immunized animals are not infected in the absence of the chief symptom of the disease. The most reliable procedure for this purpose in this disease is a bacteriological examination of the milk on one or more occasions. This procedure has been carried out on vaccine-treated animals in the Station experiment herd, and it might be said here that we have never found *Br. abortus* in the milk of a treated animal after it has been exposed to infection. Many of these animals have passed through two pregnancies.

THIRD SERIES

The third series of experiments covers the period of 1926-1927. In this series we were fortunate in being able to maintain negative controls in the herds along with the vaccine-treated animals. That is, the negative animals were divided as nearly as possible into two equal groups. One group was treated with a 10-cc dose of the non-virulent strain containing the same number of living organisms at the time of preparation as has heretofore been used. In carrying out this project, there was a total of 30 herds used, comprising 1736 cattle, situated in different parts of Michigan. The breeding records of all groups were tabulated at the end of one year after treatment.

The agglutination test applied to the serum of the animals before treatment revealed 644 (37.7 per cent) of the total number as reactors in dilutions varying from 1-25 to 1-500. The abortion disease had been present in most of the herds for a number of years, the evidence of which was revealed from the past breeding records and from positive agglutination tests extending back for a number of years. A few of the herds were free from infection, as shown by the breeding records and the agglutination tests.

TABLE III—*Summary of results of third series of field experiments with the living vaccine in thirty herds (1926-27)*

TOTAL NUMBER OF ANIMALS	ABORTIONS	PERCENTAGE
Untreated (Reactors) 644	64	9.9
Untreated (Negative) 370	30	8.1
Treated (Negative) 722	39	5.4

The summary of the results obtained in this series of experiments is set forth in table III. In the group of reacting animals,

644 in number, there occurred 64 (9.9 per cent) abortions during the year of observation. One would consider this number of abortions in such a large number of reacting animals exceptionally low. We believe that the long duration of the disease in most of the infected herds partly accounts for the low rate of abortion in this group.

Of the 370 untreated negative controls, 30 (8.1 per cent) aborted during the year of observation.

Of the 722 vaccine-treated negative animals, 39 (5.4 per cent) aborted during the year. The percentage of abortions in this group, while not high, is not very much lower than the abortions occurring in the negative controls. If all the abortions in the treated group were due to *Br. abortus*, and we have very specific evidence that many of them were not due to this organism, one would conclude that in so far as the vaccine treatment is concerned, it has little value over no treatment in reducing the number of abortions in negative animals in infected herds. But let us examine the bacteriological evidence for *Br. abortus* infec-

TABLE IV.—*Serum agglutination reactions of animals in herd 26 of third series, 18 months after treatment (12-13-27)*

VACCINE-TREATED						NEGATIVE CONTROLS					
ANIMAL	AGGLUTINATION TITER					ANIMAL	AGGLUTINATION TITER				
	1-25	1-50	1-100	1-200	1-500		1-25	1-50	1-100	1-200	1-500
A 62†	P	—	—	—	—	A 115*	+	+	+	+	+
A 117	+	P	—	—	—	A 44	—	—	—	—	—
A 39	+	P	—	—	—	A 160	—	—	—	—	—
A 142	—	—	—	—	—	A 139	—	—	—	—	—
A 149	—	—	—	—	—	A 143	—	—	—	—	—
A 153	+	+	+	P	—	A 163	—	—	—	—	—
A 82	+	+	P	—	—	A 171*	+	+	+	+	+
A 148*	+	+	+	+	+	A 32	—	—	—	—	—
A 167	+	+	P	—	—	A 102§	—	—	—	—	—
A 140	P	—	—	—	—	A 60	—	—	—	—	—
A 93	+	+	+	P	—	A 106	—	—	—	—	—
A 146	—	—	—	—	—	A 154	P	P	—	—	—
A 138	P	—	—	—	—	A 101	+	P	—	—	—
A 103	—	—	—	—	—	A 41*	+	+	+	+	+
A 105	P	—	—	—	—	A 90	—	—	—	—	—
A 107	—	—	—	—	—	A 98	—	—	—	—	—
A 100	P	—	—	—	—	A 161	—	—	—	—	—
A 135	+	P	—	—	—	A 96	—	—	—	—	—
A 79	P	—	—	—	—						
A 92	+	+	P	—	—						
A 150	—	—	—	—	—						

\+ = Complete agglutination
P = Incomplete agglutination
— = No agglutination

*Infected—per serum differential test
†Aborted 6-26-27
‡Aborted 6-20-27
§Aborted 9-10-26

tion in many of the treated animals that aborted. In one herd where there were 254 animals treated and in which 25 abortions occurred, the fetus or milk, or both, were examined from 15 of the aborting animals, and in only three cases did we succeed in recovering *Br. abortus* from the sources mentioned. In another herd where there were six abortions in 64 treated animals, the milk of the six that aborted failed to reveal *Br. abortus* when cultured or injected into guinea pigs, or to react to the agglutination test. Two of the animals aborted about two months before the milk samples were taken. The blood serum of all six animals reacted to the agglutination test in dilutions of 1-50 or below. The bacteriological findings in material examined from several of the treated animals that aborted in the other herds parallel closely the findings in the two herds just mentioned.

The serum agglutination reactions of most of the vaccine-treated and negative control animals in two of the herds in the third series of experiments are set forth in tables IV and V. The tests were made approximately fourteen months after the date of treatment. These tabulations illustrate the different degrees of

TABLE V.—*Serum agglutination reaction of animals in herd 28 of third series 18 months after treatment (12-14-27)*

VACCINE-TREATED						NEGATIVE CONTROLS					
ANIMAL	AGGLUTINATION TITER					ANIMAL	AGGLUTINATION TITER				
	1-25	1-50	1-100	1-200	1-500		1-25	1-50	1-100	1-200	1-500
962	P	P	—	—	—	973	P	P	—	—	—
976	—	—	—	—	—	942	P	—	—	—	—
877	+	+	P	—	—	941*	+	+	+	+	+
868	+	+	P	P	—	789	+	P	—	—	—
794	+	P	—	—	—	912	—	—	—	—	—
977	—	—	—	—	—	802	—	—	—	—	—
952	+	+	P	—	—	966*	+	+	+	+	+
830	+	+	P	—	—	886*	+	+	+	+	+
884†	P	—	—	—	—	923	—	—	—	—	—
909*	+	+	+	+	—	956	—	—	—	—	—
850	+	+	+	P	—	978	+	+	+	P	—
949	P	P	—	—	—	879	—	—	—	—	—
758	+	+	P	—	—	948	P	—	—	—	—
859	P	P	—	—	—	911	—	—	—	—	—
964	+	+	P	—	—	924‡	—	—	—	—	—
829	P	P	—	—	—	906	—	—	—	—	—
847	+	P	—	—	—	851	—	—	—	—	—
890	—	—	—	—	—	887	P	P	—	—	—
931	—	—	—	—	—	831	—	—	—	—	—
884	P	P	—	—	—						
945	P	—	—	—	—						

*Infected—per serum differential test.
‡Aborted 9-20-26
†Aborted 12-18-26

agglutination reaction that vaccine-treated animals may show when left with infected animals. They also emphasize very strongly the futility of trying to use the clinical symptom of the disease as a means of determining the presence or absence of infection. The serological tests show very clearly that there were infected animals that failed to abort and also that those which did abort were not infected with *Br. abortus*.

It is therefore necessary to take into account bacteriological and serological evidence as well as clinical evidence in determining the presence or absence of *Br. abortus* infection in the cow, especially when an immunizing agent is concerned.

From the three series of field experiments and those conducted on a limited number of animals in the Station experiment herd we may draw the following conclusions.

Conclusions

The injection of the living non-virulent strain of *Br. abortus* in the form of a vaccine into cattle both pregnant and non-pregnant produces no harmful results.

The injection of the vaccine into negative animals in two of the series of field tests brought about a striking reduction in the abortion rate in these animals over a period of from one to three years. In the other series in which negative controls were maintained there was not a wide difference in the abortion rate between the treated and control animals.

It has been conclusively determined that experiment animals can be protected against massive artificial infection for over a period of two years.

The vaccine must still be considered in the experimental stage and further well-controlled tests should be made to determine its value as an agent for protecting cattle against *Br. abortus* infection.

These data emphasize the fact that the efficiency of an immunizing agent against Bang's abortion disease should be determined on the basis of the presence or absence of infection rather than on the presence or absence of the most conspicuous symptom of the disease in the treated animals.

Hard To Believe

Seven persons were killed, one of them fatally, by the explosion of bombs.

—*Hazelton Plain Speaker.*

THE VETERINARIAN IN PUBLIC HEALTH WORK*

By J. P. FOSTER, *Minneapolis, Minn.*

Department of Public Welfare, Division of Public Health

Your Secretary has requested me to present a short paper describing the work performed by veterinarians connected with public health service, and as I have held the position of veterinarian to the Department of Public Welfare, Division of Public Health, of the City of Minneapolis, Minn., since March, 1921, I shall endeavor briefly to describe some of the activities incident to the duties of the office.

Minneapolis has a population of approximately 455,000, and is growing very rapidly, both as regards population and extent of territory.

The work of our division is increasing proportionately with the growth of the city, and there are at the present time sixty-six people employed in its various departments.

The particular duties delegated to the veterinarian of our Division are related to milk and dairy inspection, meat inspection, inspection of veterinary hospitals, inspection of animal or so-called pet stores, inspection of kennels, inspection of the zoo, and certain special investigations, from time to time, relating to animals suspected of being affected with diseases communicable to man, such as glanders, rabies and tuberculosis.

It may be of interest to follow the different steps to be taken, before a license to sell raw milk can be obtained in Minneapolis. The following quotations are taken from our Milk Ordinance:

> Section 1. The word "person," as used in this ordinance, shall include any and all individuals, firms, associations and corporations. The word "milk" shall include milk, cream, skim milk, butter milk and other liquid milk products intended for human consumption, but shall not include condensed milk sold in hermetically sealed cans. The words "sell" and "sale" shall include all transactions of a mercantile character. "c. c." shall mean and stand for cubic centimeter.
>
> Section 2. No person shall sell milk to consumers or for manufacturing purposes within the City of Minneapolis without first obtaining a license therefor as herein provided. Any person holding a city license to sell foods or to conduct a restaurant, hotel, or public eating house shall conform to the requirements of this ordinance in the handling and sale of milk, but shall not be required to take out a second city license.
>
> Section 3. Any person desiring a license to sell milk in the city of Minneapolis shall make application in writing to the City Comptroller for such license. The application shall state in full:

*Presented at the annual meeting of the Ontario Veterinary Association, Guelph, Ontario, October 10-11, 1928.

(a) Name and place of business of the applicant.
(b) Name of the owner and location of each dairy and dairy herd and pasteurizing plant, from which milk is to be obtained.
(c) Number of cows in each herd from which milk is obtained.
(d) Nature of milk business to be conducted as defined below: 1. Milk producer—a person who sells and delivers to the consumer milk produced at his own dairy. 2. Milk distributor—a person who sells and delivers to the consumer milk produced by other persons. 3. Operators of a pasteurizing plant—a person who pasteurizes and sells milk.
(e) Class of milk to be sold.
(f) Kind of each vehicle to be used in delivering milk and the number by which it is designated.

If raw milk is to be sold the veterinary surgeon's certificate with such affidavits or certificates prescribed in Section 4 shall be filed at the time the application for a license is made.

Section 4. Every applicant to sell raw milk shall submit his application with a certificate showing that his dairy herd or herds or the herds from which milk is to be obtained have been given a tuberculin test within six months of the date of such application by a graduate veterinarian approved by the State Live Stock Sanitary Board and in accordance with the regulations for the tuberculin test of cattle prescribed by the State Live Stock Sanitary Board.

The veterinary surgeon's certificate shall show the test applied, the date upon which the test was made, the number of dairy cattle tested with a description of each animal and all other data required to complete the form used and approved by the State Live Stock Sanitary Board, together with the results of the test and the number of the tag attached to each non-reacting animal. Such tag and description, or in the instance of state accredited tuberculosis-free herds, the name and description shall be sufficient to properly identify all cattle tested. Animals tested and found free of tuberculosis if registered on the state accredited tuberculosis-free herd list of the State Live Stock Sanitary Board may not be tagged. The veterinary surgeon's certificate shall bear thereon a statement signed by the veterinary surgeon who actually conducted the test, certifying that he actually made the tests of animals thereon listed and described, that all reacting animals are shown and that the record is complete, and is a true and faithful showing of the tests as made. The certificate as thus completed, and the veterinary surgeon making such tests, and such tests, shall be approved by the State Live Stock Sanitary Board over the written signature of its secretary.

After the removal of any and all tuberculous animal or animals from the herd or herds so tested the premises on which such animals have been kept shall be disinfected in a manner approved by the Commissioner of Health and a sworn statement to that effect made and submitted by the applicant.

The applicant for license to sell raw milk shall make affidavit on a form prescribed by the Commissioner of Health to be submitted with his application for a license to sell milk, that he has permanently removed from his or any other herd from which milk is to be produced all animals which were shown by the veterinary surgeon's certificate to be tubercular reactors, and further that no animals will be added to his or any other herd from which milk is to be produced until such animals have been tested for tuberculosis and found to be free from it as prescribed in this section.

We now have arrived at the point where we are ready to inspect the herd and the premises.

The score-card used is the one prescribed by the United States Department of Agriculture, and is divided into two parallel columns, one side devoted to equipment, the other to method. The "equipment" consists of the dairy herd, the dairy barn, the

milk-room and the utensils. The "method" refers to the condition in which the different parts of the equipment, just enumerated, are maintained, as well as the handling and cooling of the milk. The perfect mark on equipment is 40—the passing mark is 30. The perfect mark on method is 60—the passing marks is 50.

It is quite evident that we may have at least four possibilities in equipment and method, namely, good equipment and method; poor equipment and method; good equipment with poor method; and poor equipment with good method.

Usually the first procedure after arriving at a dairy is to check the herd. By this is meant that the ear-tag number and description of each animal is checked with the number and description indicated on the tuberculin test chart covering the herd, which has been submitted to the Department by the applicant for a license. If there are any discrepancies, either in the ear-tag numbers or the descriptions, the errors must be rectified by the veterinarian who made the test, before the health of the herd can be certified. The reason that the herd usually is checked first is that "Health of herd" is given first consideration on the score card and, furthermore, if the health of the herd is not established, it would be a waste of time to proceed with the scoring of the remainder of the equipment.

In addition to the checking in of cattle that have successfully passed the tuberculin test, a physical examination is made of each animal, and any cow suffering from mastitis or other udder disease, eye cancer (so-called fungus haematoides), abscess, fistula, or retained afterbirth, is rejected.

The health of the herd being established, we now are ready to proceed with the scoring of the remainder of the equipment. The following quotations taken from the Milk Ordinance are mandatory:

> Section 37. No building shall be used for stabling cows for the production of milk to be sold in Minneapolis unless it is in good repair and the ceiling tight and dust proof. The interior shall be whitewashed every six months unless the construction renders whitewashing unnecessary.
>
> Section 38. The floor shall be water-tight and so graded as to permit prompt drainage to one or more points of discharge. No animal other than milch cows shall be kept in any place where milk is produced or handled.
>
> Section 39. Cow stables shall contain not less than 400 cubic feet of air space for each cow, nor less than three square feet of window area per cow, distributed so as to meet the approval of the Minneapolis Department of Health.
>
> Section 40. Cow manure shall be removed from cow stables twice daily. Ceilings, walls and ledges in the cow stables shall be kept clean

and windows shall be washed at least twice each year. Horse manure shall not be used in a cow stable for any purpose.

Section 41. Cows shall be kept clean at all times. Before milking, the teats, udders and flanks shall be carefully cleaned. Milking shall be done with clean, dry hands or a machine which has been sterilized before use. Receptacles into which milk is drawn from the cows shall have small tops so as to exclude dirt and foreign substances from the milk.

Section 42. Milk as soon as it is drawn shall be strained from the pail, removed immediately from the stable and cooled at once to a temperature between 34 degrees and 50 degrees Fahrenheit. Milk which is to be sold raw shall be kept at a temperature between 34 degrees and 50 degrees Fahrenheit until delivered to the consumer.

Section 43. Barnyards shall be well drained and kept in such condition that the cows' udders, teats, or flanks cannot become defiled. No drain shall discharge within fifty (50) feet of the milk room.

Section 44. The well or other water supply shall be so located, arranged and constructed that it cannot become contaminated by drainage from any source.

Section 45. Suitable toilet facilities shall be provided. No water closet, privy, cesspool, urinal or inhabited room shall be located within any cow stable, milk room or other place where milk is handled. Water closets and privies shall be screened from May 1 to November 1 so as to exclude flies from both building and vault.

Section 46. All persons while milking or handling milk shall wear clean washable outer garments. The use of tobacco, snuff or intoxicants during the process of milking or in the milk room is prohibited.

Section 47. Each dairy shall have a milk room which has no direct connection with any stable or dwelling room and which shall be used solely for cooling, separating, bottling and storing milk and the operations incident thereto. No milk shall be bottled at the dairy except in the milk room.

Section 48. Milk rooms shall have sufficient sunlight and such artificial light as the Department of Health may require. Adequate ventilation shall be provided.

Section 49. Ceilings and walls shall be painted or whitewashed unless the construction renders it unnecessary. Milk-room floors shall be of cement or other material impervious to water. They shall be watertight and so graded that all drainage will flow toward one or more points of discharge. Milk rooms shall be kept clean and sanitary within and without. They shall be well screened from May 1 to November 1 and shall be kept free from flies and offensive odors.

Section 50. Milk rooms shall be provided with a steam sterilizing device approved by the Department of Health. All utensils and containers shall be thoroughly sterilized with live steam before each use.

Section 51. Each milk room shall contain a cooling tank which shall be drained and thoroughly cleaned at least once a week and oftener if necessary to keep it clean and sanitary.

Section 52. Surface coolers, unless located in a room used only for cooling milk, shall be protected by suitable metal covers.

Section 53. Caps for bottles shall be purchased in sterilized containers and shall remain protected from contamination until used.

Section 54. The apparatus or device used in bottling milk or capping milk bottles must be so constructed that the milk and caps used in the process will not come in contact with human hands. The apparatus or device shall be subject to the approval of the Department of Health.

Section 55. No cats, dogs, or other animals shall be permitted in the milk room or rooms where milk is stored or handled.

When new cattle are to be added to a herd, they are at first stabled in some building other than the dairy barn. The Health Department is advised—usually by telephone—that there are new cattle to be added to the herd in question, and we seldom

fail to check in the cattle on the same day that we are notified. By "checking in" is meant, that the ear-tag numbers and descriptions of the new cattle must check with the tuberculin test chart which accompanies the animals and, furthermore, that the animals must pass a satisfactory physical examination before being permitted to enter, and become a part of the original herd. A "Form H. 357," which is a permit to allow the new cattle to be added to the herd, is filled out and delivered to the licensee. This permit gives the name and address of the licensee, the license number, the ear-tag numbers, and the descriptions of the cattle. A carbon copy of this permit is kept in the office records. The section of the ordinance governing the addition of cattle to a herd is as follows:

> No cattle shall be added to any herd from which raw milk is to be sold in the City of Minneapolis after an application for a license to sell raw milk therefrom in the City of Minneapolis has been made unless and until such additional cattle shall have been tested with the tuberculin test as herein provided and the veterinary surgeon's certificate of such test properly approved has been filed with the commissioner of health, and such addition to any herd has been approved by the commissioner of health.

Your patience will not be further taxed by reciting the various sections of the Milk Ordinance relating to standards, classes, and labels, nor those covering pasteurization processes, and the sampling, handling, storing and distribution of milk—although I shall be pleased to enlighten anyone interested in these matters in any discussion which may follow the reading of this paper.

About one-third of our dairies are producing milk that quite often runs as low as 5,000 bacteria per cubic centimeter, while two of them have had counts as low as 3,000. When samples are higher than the standards, in bacteria, or lower than the standards, in butter fat, the holder of the license is brought into Municipal Court and fined. The minimum fine is $10.00.

In our office records, each dairy is represented by a "jacket," in which are kept all tuberculin test charts, carbon copies of permits to add cattle, scores, and any other information relative to the dairy that appears to be important.

The following figures* will indicate, in a measure, the amount of work that is being done by our Milk and Dairy Inspection force. The three inspectors connected with this sub-division, from January 1, 1928, up to and including September 29, 1928, a period of 9 months, made 8,146 inspections and collected 3,362

*Chart exhibited showing list of licensees, number of cattle in each herd and total number of cattle in herds from which raw milk is sold in the city of Minneapolis. Chart also shows that in the tuberculin tests made during the spring of 1928, there were 1.1 per cent reactors, and in the area test of Hennepin County, made in September, 1928, there were 1.4 per cent reactors.

milk and cream samples. This is an average of over 905 inspections, and over 362 samples per month. At this rate the annual inspections would total 10,860, while the samples would total 4,344.

Before leaving the subject of milk and dairy inspection, I wish to draw your attention to a chart indicating the results of tuberculin testing in all herds from which raw milk is sold in the city of Minneapolis.

As no slaughtering of cattle, swine or sheep, is conducted in Minneapolis, and as practically all of the city's meat supply comes directly from South St. Paul and Midway, at which points federal and state meat inspection is maintained, slaughter-house inspection is not required.

A limited number of calves are slaughtered on farms adjacent to the city during certain seasons of the year, which entails a certain amount of meat inspection service on the part of our department. Inspection is also occasionally required with reference to tainted meats.

An ordinance was passed by our City Council, in 1922, and amended, in 1926, the first section of which is as follows:

> Section 1. No person shall keep or maintain within the City of Minneapolis any place for the care, exhibition or sale of any foxes, bears, wolves, dogs, monkeys, rabbits or other small animals, or any birds, reptiles or fish without first obtaining a license therefor as herein provided.

The other sections of this ordinance regulate the inspection of the animals with reference to infectious or contagious diseases; the maintenance of sanitation in the establishments, and the conducting of the same in "a proper and humane manner." It has been held that this ordinance affects veterinary hospitals, animal or pet stores, breeding or boarding kennels, zoological gardens, and exhibits of fur-bearing animals by persons or firms interested in the fur industry. The enforcement of the provisions of this ordinance is entrusted to the veterinarian of the Health Department.

Dog Bites

Referring to the duties involved in the investigation of reports of diseases affecting animals which are communicable to man: Our statistician informs me that during the past four years there have been about 300 dog bites reported to the Health Department each year.

As a usual thing the persons bitten are milkmen, icemen, postmen, delivery boys, and boys riding bicycles. There is something

about a peddler with a pack on his back that is especially irritating and displeasing to some dogs; nor is the itinerant scissors-grinder particularly popular in canine circles. If the person who has been bitten calls a physician, the accident usually is reported to the Health Department by the patient's doctor. Information as to the name and address of the person bitten, the name and address of the owner of the dog, and a description of the dog, are secured if possible, and made a matter of record in the office. The animal is quarantined at the pound for fourteen days, and during this time is kept under observation. If the dog dies from any cause whatsoever before the expiration of the quarantine period, the brain is examined for evidences of rabies, as a routine procedure.

Occasionally, a person who has been bitten, or the mother of a child that has been bitten, becomes very much alarmed over the affair; in which event it sometimes seems advisable to make a call at the home of the disturbed person, and, going over the situation very carefully, bring out the fact that although 300 people are bitten annually in the city, there has been but one known case of rabies in a human being in Minneapolis—and that, many years ago—nor has there been an authenticated case of rabies in a dog since 1917. It is well to explain further, that rabies is communicated only by a rabid animal, that the dog which did the biting has the appearance of being remarkably healthy, and is being carefully watched. If handled tactfully, it often is possible to transform a person who is on the verge of hysteria, into one whose mind is set at ease. To be the means of allaying the fears of a frightened mother is certainly worth while.

Rabies

We now come to another side of the story: Several cases of rabies in dogs and cattle have been reported in Minnesota during the past summer, but until quite recently it was hoped that the Twin Cities might escape an epizöotic of this disease. However, on July 6, a dog arrived in St. Paul from Omaha, Neb., and becoming sick during the latter part of August, a diagnosis of rabies was made. The animal died on September 1, and an examination of its brain conducted by the State Board of Health on September 3, disclosed no Negri bodies. Rabbits were inoculated with material secured from the brain of the dog, and, on September 22 (19 days later), the rabbits succumbed and Negri bodies were found in their brains. Those who are acquainted with the facts are of the opinion that this dog was exposed to the

infection in Omaha, where the disease had been and still is quite prevalent for some time, and that this case had no connection with those cases which developed in other parts of the state of Minnesota earlier in the summer.

Glanders

Glanders has been practically eradicated from the state of Minnesota. In 1904, 110 horses were killed, in Hennepin County alone, that were affected with this disease; 110 in 1905; 117 in 1906; 48 in 1907; 26 in 1908; 15 in 1909; 29 in 1910; 17 in 1911; 11 in 1912; 10 in 1913; 3 in 1914; none in 1915; 1 in 1916; 3 in 1917; 6 in 1918; 9 in 1919, since which time, or for a period of nine years, no cases have been discovered in the county in which Minneapolis is situated.

These results have been accomplished, according to the report of the State Live Stock Sanitary Board, "by preventing the importation of infected animals, by the killing of all horses affected with the disease, and the payment of indemnity to the owners, and by quarantining all exposed horses until they have passed satisfactory mallein tests." To the foregoing may be added the reduction of the equine population, the abolishment of public drinking-troughs, and the activities of an efficient and energetic State Live Stock Sanitary Board.

Trained for the Work

The foregoing description of the activities of the veterinarian engaged in public health work should bring to your minds a realization of the importance of the position, and the possibilities for even greater usefulness in the future, as this line of work becomes more highly organized. The veterinarian is the *only* logical person to perform the duties required of the holders of these positions. *He is educated and trained along the lines demanded as are the members of no other profession.* At the present time the conservation of health is one of the things most widely discussed and most ardently desired. The standards set for the protection of public health, already high, must be raised to still higher levels, and we as members of the veterinary profession must contribute our share to this great cause. If we expect the public to appreciate the value of the work we are doing, we must undertake to serve our city, or community, to the best of our ability. In the enforcement of orders as health officers, we should treat all with equal courtesy and consideration, and "play no favorites." We should command the confidence of the people

with whom we deal. We should stand on the side of right, and the enforcement of the ordinances, and we shall be the gainers, rather than the losers, in the end. As professional men, we should keep up with the times, for as has been said by one of our great philosophers:

> That man is ready for his burial robes, who allows present laurels to satisfy him. To cease to be a student soon places one outside the ranks of his profession. This world has made no provision for the sluggard. It is like a road—a fine place for travel, but a poor place on which to sleep.

And finally, becoming personal, I would entreat you—no matter in what particular line of endeavor you may be engaged—never to be disloyal, either in word or thought, to your profession. In your contact with medical men, or other public health workers, never develop a sense of inferiority and become ashamed of the fact that you are a veterinarian. In other words, as is so aptly expressed in the vernacular, "Be yourselves."

Most of you who are present have sat at the feet of either Andrew Smith, Duncan McEachran, the Daubignys, Edward A. A. Grange, or Charles D. McGilvray, and if you have used these men as examples of industry and integrity, you may well be proud of yourselves and your profession. You may even go as far as to say, with that true Nature's nobleman, the late John W. Adams, "I love the veterinary profession. It completely fills my being. It satisfies my noblest longings—all my soul's desires."

World Survey of Live Stock Improvement

The results of the world survey of live stock improvement have been prepared in pamphlet form by the Bureau of Animal Industry, U. S. Department of Agriculture. The report covers the activities of thirty-three countries with respect to live stock improvement and outlines the principal methods in use, together with results obtained.

The survey shows a rather striking similarity between the methods in use in the United States and those in other important live stock countries. A tabulated summary of the entire survey shows that the United States ranks high among the countries most active in live stock improvement, but that its efforts have been largely along educational lines, whereas a number of other countries have given more direct assistance, such as financial aid, to breeders of improved stock and official awards at shows. Copies may be obtained on application to the Bureau of Animal Industry, U. S. Department of Agriculture, Washington, D. C.

SOME FUNDAMENTAL PRINCIPLES UNDERLYING THE PREPARATION AND USE OF VETERINARY BIOLOGICS*

By F. A. IMLER, *Kansas City, Kansas*

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Biologics have come to play such an important part in the eradication and control of diseases of animals, that every veterinarian should be familiar with the preparation and use of these products.

IMMUNITY

In order to understand fully the preparation and use of biologics, it is necessary to be familiar with the principles of immunity. It seems proper and fitting, therefore, that we briefly discuss these principles.

An infectious disease is sometimes spoken of as a contest for supremacy, within an organism, between an infective agent and the body cells. In this contest the infective agent or invader and the body cell or defender use definite and well-organized plans of attack and defense. The outcome of the contest is dependent entirely upon the character of the defense provided by the body cell. If the defense is adequate, the infective agent is repelled and the organism recovers. If it is inadequate, the organism succumbs. This defense or resistance of an organism or animal against infectious disease is what is known as immunity. It may be either natural or acquired.

Natural immunity is an immunity with which the animal is born. Acquired immunity is produced as a result of recovery from a disease or by artificial means. We are concerned with an immunity produced by artificial means. One type of this form of acquired immunity is produced by the entrance of the infective agent stimulating the body cell to the production of immune substances or antibodies. In such cases the body cell itself produces the antibodies in an active form and such an immunity is spoken of as an active immunity. An active immunity develops only after one or two weeks and since the stimulation of the infection upon the body cell causes the continuous development of antibodies, a lasting immunity is produced.

*Presented at the thirty-fifth annual meeting of the Missouri Valley Veterinary Association, Kansas City, Missouri, November 20-22, 1928.

The duration of an active immunity is usually from several months to more than one year. The word "permanent" is frequently used in speaking of the active immunity established in hogs immunized against hog cholera by the use of the simultaneous method of vaccination. What is probably meant is that the immunity established will last during the life time of the animal, which, in the case of a hog, does not average much over one year. Since there is no such thing as a permanent immunity, acquired by artificial means, the use of the term "permanent," when speaking of an active immunity, is obviously in error and should be avoided, unless fully explained.

If the immune substances or antibodies from an actively immune animal are introduced into a non-immune animal, another type of acquired immunity is produced. In such cases the body does not produce the antibodies in active form but they are introduced from outside the body by inoculation and such an immunity is spoken of as a passive immunity. A passive immunity is established immediately after inoculation, but since there is no infective agent present to stimulate the body cells to the production of active antibodies, no lasting immunity is produced. The duration of a passive immunity usually does not exceed a few weeks or months at most. From the above, it will readily be seen that the production of an active immunity has a great advantage over a passive immunity. Whenever it is practicable, and conditions are favorable, therefore, it is advisable to employ a method of immunization which will produce an active immunity.

It frequently becomes necessary, however, to employ a method of immunization by which the spread of a disease can be checked immediately, and in such instances the production of a passive immunity has the advantage over an active immunity, because it affords the animal immediate protection against infection. Such a method is also necessary in those instances where it is not practicable or conditions are not favorable to production of an active immunity. It is quite common, however, for both methods to be used in combination, by which the animal is given immediate and also a lasting protection or immunity against an infectious disease. This is accomplished by using a combined inoculation of infective agent and antibodies. This method of immunization is known as the simultaneous method, and is commonly used in the immunization of animals against anthrax and hog cholera.

The purpose of inoculating the animal with the antibodies, simultaneously with the infective agent, is to afford it protection against the disease until the active immunity has become established. It can readily be seen, therefore, that for this method to be successful, the quantity of infective material must be sufficient to stimulate the body cells to active antibody production and the number of antibodies introduced must be sufficiently large to insure protection of the animal against the disease until active immunity has been established. Further, if this method of immunization is to be attended with good results, the animal should be in normal health, free from any infectious disease or other condition which lowers its resistance. Any condition which lowers the resistance of the animal, tends to increase the activity of the infective agent.

There are, therefore, three important factors to be considered in connection with the successful employment of the simultaneous method of immunization against disease. They are: (1) The animal should be in normal health. (2) The quantity of infective material should be sufficient to stimulate active antibody production. (3) The number of antibodies introduced should be sufficiently large to insure protection to the animal until active immunity is established.

Veterinary biologics may be classified according to source, method of preparation, etc., into five groups, viz., aggressins, antisera and sera, bacterins, vaccines and viruses, and diagnostic agents.

Aggressins

The veterinary biologics popularly termed aggressins are frequently classified into two groups, viz., natural aggressins and artificial or cultural aggressins.

Natural aggressins occur in the inflammatory exudates from infective processes. They are produced commercially by subjecting susceptible animals to a fatal artificial infection with cultures or other casual agent of certain specific diseases. Soon after the animal has succumbed to the artificial infection, the edematous fluids are collected and all affected tissues are excised and pressed until all the liquid has been obtained. This is suitably preserved and filtered until free of all living organisms or germs. Blackleg aggressin, hemorrhagic septicemia aggressin and anthrax aggressin are samples of natural aggressins.

Blackleg filtrate is the only veterinary biologic now in use which is regarded as an artificial or cultural aggressin. It is prepared by cultivating the blackleg organism in specially prepared media for a period until the maximum growth is obtained and until the liquid becomes thoroughly charged with the products of the germs and of their action on the meat contained in the media. The liquid is then suitably preserved and filtered free of all living organisms or germs as in the case of natural aggressins. Blackleg filtrate, therefore, is an aggressin obtained from laboratory cultures and blackleg aggressin is the filtrate obtained from affected animal tissues.

The nature of aggressins is not fully understood. However, there is strong evidence to show that they may be endotoxins liberated by the breaking up of the microörganisms. They belong to the group of biologics which produce an active immunity or a type of immunity which does not develop until several days after inoculation. The period following treatment with an aggressin or germ-free exudate, before immunity is established, is rather indefinite, but as a rule, it requires from ten days to two weeks. During this period treated animals are highly sensitive or susceptible to diseases caused by organisms or germs of the same species as those used in the preparation of the aggressin with which treated, and if exposed to a natural or an artificial infection will die as though untreated. If an infected animal is treated with an aggressin prepared by the use of organisms or germs of the same species as those causing the infection, the causal agent will rapidly multiply and complete for that animal the course of an acute natural infection.

Aggressins possess no curative value and their use is indicated only in those cases where the animal is in normal health and will not be exposed to a natural or an artificial infection for from ten days to two weeks after treatment.

Antisera and Sera

There are two varieties of antisera, viz., antibacterial or antimicrobic, and antitoxic.

An antibacterial or antimicrobic serum is the clear serum, plasma, or defibrinated blood, or derivative thereof, from an animal which has been actively immunized to large quantities of an antigen containing (1) the virus or causal agent of the disease for which the serum is to be used as a preventive or treatment or

(2) those bacteria which commonly occur in conjunction with, but secondary to, the principal cause of the disease.

An antigen is anything that will cause the production of antibodies or immune substances. It may be the blood or other body tissue from an animal sick of the disease, or it may be a suspension of bacteria (living or dead) either in the medium in which grown or in physiological salt solution. An animal which has been successfully immunized to large quantities of an antigen is spoken of an a hyperimmune.

Anti-blackleg serum, anti-anthrax serum and anti-hemorrhagic septicemia serum are examples of an antibacterial or antimicrobic serum, prepared by the use of an antigen containing the virus or causal agent of these diseases. Anti-influenza serum for horses is an example of an antibacterial serum prepared by the use of an antigen containing those bacteria which commonly occur secondary to the principal cause of the disease.

An antitoxic serum or antitoxin is the clear serum, plasma, or derivative thereof, from an animal which has been immunized to large quantities of the specific toxin produced by the organism responsible for the disease for which the antitoxin is to be used as a preventive or treatment. An antitoxin is capable of directly neutralizing the toxin used in its preparation not only within the system of the immunized animal but also outside it. Tetanus antitoxin and botulinus antitoxin are examples of an antitoxic serum or antitoxin.

In the preparation of an antibacterial serum the antigen is injected into the animal intravenously. In the preparation of an antitoxin the antigen or toxin is injected subcutaneously. The animals most commonly used in the preparation of serums and antitoxins are horses, mules, cattle and hogs. Hogs, however, are used only in the preparation of anti-hog cholera serum.

In the preparation of anti-hog cholera serum the hyperimmunization is accomplished by a single intravenous injection of a massive quantity of the antigen. In the preparation of practically all other serums and antitoxins the hyperimmunization is accomplished by the injection of gradually increased quantities of the antigen administered at regular intervals over a period of several weeks.

Antisera and antitoxins belong to the group of biologics which produce a passive immunity or a type of immunity which is established immediately after inoculation. Their use, therefore, is indicated in those cases where this type of immunity is advisable

or desirable. Such cases include those where the animals have been exposed to the disease or where their physical condition is such that it is not advisable to attempt to produce an active immunity. The use of serums and antitoxins may be attended with good results when employed in the treatment of an animal already infected, provided they are administered in the very early stages of the disease and then in very large doses. The best results may be expected, of course, when the serum or antitoxin has been prepared by the use of an antigen containing the causal agent of the disease or the specific toxin produced by the causal agent.

Bacterins

Bacterins, or bacterial vaccines, as they are sometimes called, are made by suspending bacteria which have been devitalized or killed by heat or an antiseptic, either in normal or physiological saline solution or in the culture medium, to which a suitable preservative has been added. Those bacterins made by suspending the bacteria in normal or physiological saline solution usually are standardized to contain a definite number of bacterial bodies in each cubic centimeter or dose. Those made by suspending the bacteria in the medium in which grown, however, are not standardized but consist of the undiluted culture.

Bacterins are classified into autogenous and stock bacterins. An autogenous bacterin is made from organisms obtained from the patients' own lesions, while stock bacterins are made from representative types of the organisms in question. Stock bacterins are generally polyvalent, that is, they contain a large number of different strains of the same bacterial species. Polyvalent bacterins are to be distinguished from mixed bacterins, the latter containing strains of different bacterial species.

In order to have a clear understanding of the scientific basis of bacterin therapy, it may be helpful to consider the subject from the standpoint of our knowledge of anaphylaxis. Anaphylaxis concerns the effect of proteins or albuminous substances upon animals; it concerns all proteins whether they are poisonous in themselves or not. For instance, egg white and normal horse serum act precisely as the proteins of bacteria. Furthermore, the proteins of dead bacteria act practically in the same way as proteins of living bacteria. It must be remembered, however, that anaphylactic symptoms can be produced only by proteins foreign to the animal. In its derivation, anaphylaxis means a

lack of resistance—it is the opposite of prophylaxis. However, it has been shown that instead of being the opposite of immunity, anaphylaxis is merely one of its manifestations.

When foreign proteins, including dead bacteria or bacterins, are injected into the tissues of an animal, the body cells at once set to work to remove this protein. They prepare a ferment or antibody capable of splitting the protein molecule into two parts —the one poisonous and the other non-poisonous. The poisonous part obtained from all proteins is the same whether it results from the splitting of egg white or the splitting of the protein of bacteria. The poisonous part is a poison and has no other function, and after the first injection is liberated slowly and is therefore harmless in its effect. The non-poisonous part, on the other hand, is specific in its action which stimulates the body cells to produce a large amount of a ferment or antibody-like substance capable of splitting the protein molecule of living bacteria of the same species as those involved. Thus an immunity isestablished of the active type.

It will now be clear that one of the requisites to success in bacterin therapy is that the bacterin injected must contain bacteria identical in kind with those causing the infection. In other words, the bacterin must be specific. Hemorrhagic septicemia bacterin prepared by the use of the hemorrhagic septicemia organism, for instance, is specific for infections caused by this organism, but it is not specific for infections caused by other species of bacteria.

Vaccines and Viruses

True vaccines are biologics prepared by suspending living or attenuated microorganisms or viruses in a suitable medium. When living organisms are employed in the preparation of vaccines they usually are avirulent in type. When attenuated organisms or viruses are employed in the vaccines, the attenuation may be accomplished by treating them with chemicals or heat or by passing cultures of the organisms through another species of animal, thus increasing their virulence for the latter but decreasing it for the original species.

True vaccines produce an immunity of the active type. Their field of usefulness is entirely prophylactic. They should never be employed as curative agents. Anthrax vaccine, blackleg vaccine, bovine abortion vaccine, chicken pox vaccine and rabies vaccine, prepared either by the Högyes or Pasteur method, are

examples of true vaccines. Single-injection rabies vaccine, so called because only one injection is required, is not a true vaccine. This product consists of a suspension of rabies virus, which has been killed by treatment with phenol, in a suitable medium.

The actual causative agents of several diseases of animals have not been isolated and it has so far been impossible to cultivate them artificially. Rabies and hog cholera are among those diseases. In order to produce an active immunity against rabies or hog cholera, therefore, no better method is available than to employ some substance of the body which is known to contain the causative agent, either alone or in conjunction with another biologic. This body substance is referred to as the virus.

In the case of rabies, the virus consists of the brain and spinal cord of rabbits or sheep which have succumbed to this disease. This virus, which, after attenuation or devitalization, is referred to as rabies vaccine, is used alone. In the case of hog cholera the virus consists of the blood of pigs sick of this disease. In the immunization against hog cholera no attempt is made to weaken or attenuate the virus and in this respect it is the only virus in general use. Therefore, it should be used only in conjunction with anti-hog cholera serum.

Diagnostic Agents

There is a very important group of veterinary biologics, which, though not of therapeutic value, are used as diagnostic agents. These biologics may be defined as products prepared from certain organisms or the medium in which they have grown. For the most part, they consist of the medium in which pure cultures of the organisms have been grown for a period of several weeks. The cultures are killed and the medium is concentrated by evaporation, and filtered. Usually, different forms of the products represent varying degrees of concentration of the medium. These agents evidently are protein in character and are capable of producing a specific reaction in animals infected with, or sensitized by, the products of those organisms used in their preparation.

The diagnostic value of these biologics is intimately associated with the physiological response of the infected or sensitized animal to the injection of the product. This physiological response is referred to as "reaction." The entrance of an infection into an animal always stimulates the production of antibodies. As a result the body shows either an increased or diminished

resistance against infection. An increased resistance is manifested as immunity and a decreased resistance as hypersensitiveness. This state of hypersensitiveness toward the infection, or its products, may be utilized for diagnostic purposes in some diseases. For example, an animal affected with glanders or tuberculosis will develop a hypersensitiveness against the products of the germs causing these diseases. The injection of these respective products, known as malleir and tuberculin, into infected animals, will result in a general or local reaction manifesting itself by a rise in temperature, systemic disturbances and local swellings at the point of inoculation.

Investigation has shown that these reactions may be induced in various ways. According to the method of application, they are known as subcutaneous, ophthalmic, intradermal and intrapalpebral tests. The utilization of the hypersensitive state of the infected animal, to respond to the introduction of the respective antigens in visible or otherwise determinable manifestations, is the basic principle in all of these tests. In the subcutaneous test a typical rise in temperature associated with more or less systemic disturbances is obtained; in the ophthalmic test infected animals respond with a purulent conjunctivitis; in the intradermal test a pronounced edema is produced at the site of inoculation.

Among the diagnostic agents now in use are johnin, mallein, pullorin and tuberculin. Johnin is used as a diagnostic agent for the detection of Johne's disease, sometimes spoken of as paratuberculosis, pseudotuberculosis and various other names; mallein is used for the detection of glanders; pullorin for the detection of *S. pullorum* infection in fowls and tuberculin for the detection of tuberculosis in domestic animals and fowls. Of the several biologics used as diagnostic agents, mallein and tuberculin are, without doubt, of the greatest importance to the veterinary profession. Most of the other diagnostic agents are still in the experimental stage and their value has not been sufficiently proved.

In conclusion, I may say that there seems to be much confusion in the field of veterinary biologics. This is not surprising when it is realized that on July 1 of this year there were in force U. S. Veterinary Licenses for the preparation of 71 different veterinary biologics and that these were marketed under 267 different names.* In many instances practically the same biologic is

*See report of the A. V. M. A. Committee on Veterinary Biologics, in the JOURNAL for October, 1928, pp. 735-742.

marketed under several different names. The value of many of these products has been proved. Others are in the experimental stage and still others may have little or no value at all. The manufacturers of veterinary biologics can make a substantial contribution to the relief of the confusion which now exists, by adopting a uniform nomenclature. The veterinarians themselves can contribute much to our knowledge of the value of many of these products through a thorough knowledge and close application of the fundamental principles underlying their use.

Veterinarians' Conference

Over 300 veterinarians of the state met at Ohio State University last week for their fourth annual state conference to discuss problems peculiar to this profession and to the live stock industry. Theirs is a profession that is wholly dedicated to service to the farmer and to the welfare of his live stock. If the farmer does not prosper and lets his herds and flocks dwindle then the veterinarian's practice dwindles with it.

The keynote of the conference seemed to be "Service." The practitioners are as interested in helping the farmer keep his live stock well and thrifty as in curing them after they are ailing. Farm sanitation is one of the biggest problems of the live stock industry in these days of larger herds, more crowded conditions, and no more virgin territory and fresh ground on which to move. New diseases and infections seem to be springing up every year to attack our live stock and the best way to control and check the ravages of these is to use strict sanitary measures.

Here is a big service that the veterinarian in your locality can perform. He is worth just as much or more to you to prevent disease among your animals as to prescribe for them after they are down. It might be worth many times his fee to have him come out to your farm, look over your live stock and barns and make suggestions as to ventilation, drainage or general management.

—*Ohio Farmer.*

Erratum

In the article, "Starch Digestion in the Dog," by Roseboom and Patton, in the April issue of the JOURNAL, several of the boxheads in table II (page 771) were transposed. These should read in the following order from left to right: Raw starch, boiled potato, bouillon cube, boiled macaroni and raw hamburger.

STERILITY IN BOAR RESPONSIBLE FOR REDUCED SIZE OF LITTERS*

By JULIUS E. NORDBY, *Moscow, Idaho*

Agricultural Experiment Station, University of Idaho

As a general rule, if sterility or partial sterility occurs in a female or two in a herd, it is not such a serious matter. However, when such a condition is associated with the herd sire it is much more significant. Such a specific case was recently brought to the writer's attention by a breeder of purebred swine who had a selected herd of ten tried sows which had been producing regularly litters of normal size, varying from seven to ten pigs.

A young boar of commendable individuality and apparently normal in every way was introduced into the herd and mated to all of the sows in the fall of 1927. During the mating season the boar was allowed to run with the sows in an eleven-acre field, one quarter-mile from their sleeping quarters. In the field the sows and boar had access to green forage in addition to some corn that they were "hogging off." During the gestation period the sows were fed field peas, corn and alfalfa hay. In the spring of 1928, the ten sows farrowed thirty-four pigs with litters varying from one to six pigs per litter (table I). Two of the sows were

TABLE I.—*Farrowing record of sows for 1927 when mated to normal boar, and for 1928 when mated to Discount*

Sow	Pigs Farrowed Per Litter			
	Spring 1927	Fall 1927	Spring 1928	Fall 1928
1	7	8	6	
2	10	9	1	
3	10	8	3	
4	10	8	4	
5	9	10	5	
6	10	10	2	
7	9	7	1	
8	9	8	5	
9	10	9	2	3
10	9	10	5	2
Total pigs farrowed.	93	87	34	5
Average pigs per litter.....	9.3	8.7	3.4	2.5

*Published with approval of the Director as paper No. 59 of the Idaho Agricultural Experiment Station. Received for publication, December 7, 1928.

marketed under several different names. The value of many of these products has been proved. Others are in the experimental stage and still others may have little or no value at all. The manufacturers of veterinary biologics can make a substantial contribution to the relief of the confusion which now exists, by adopting a uniform nomenclature. The veterinarians themselves can contribute much to our knowledge of the value of many of these products through a thorough knowledge and close application of the fundamental principles underlying their use.

Veterinarians' Conference

Over 300 veterinarians of the state met at Ohio State University last week for their fourth annual state conference to discuss problems peculiar to this profession and to the live stock industry. Theirs is a profession that is wholly dedicated to service to the farmer and to the welfare of his live stock. If the farmer does not prosper and lets his herds and flocks dwindle then the veterinarian's practice dwindles with it.

The keynote of the conference seemed to be "Service." The practitioners are as interested in helping the farmer keep his live stock well and thrifty as in curing them after they are ailing. Farm sanitation is one of the biggest problems of the live stock industry in these days of larger herds, more crowded conditions, and no more virgin territory and fresh ground on which to move. New diseases and infections seem to be springing up every year to attack our live stock and the best way to control and check the ravages of these is to use strict sanitary measures.

Here is a big service that the veterinarian in your locality can perform. He is worth just as much or more to you to prevent disease among your animals as to prescribe for them after they are down. It might be worth many times his fee to have him come out to your farm, look over your live stock and barns and make suggestions as to ventilation, drainage or general management.

—*Ohio Farmer.*

Erratum

In the article, "Starch Digestion in the Dog," by Roseboom and Patton, in the April issue of the JOURNAL, several of the boxheads in table II (page 771) were transposed. These should read in the following order from left to right: Raw starch, boiled potato, bouillon cube, boiled macaroni and raw hamburger.

STERILITY IN BOAR RESPONSIBLE FOR REDUCED SIZE OF LITTERS*

By JULIUS E. NORDBY, *Moscow, Idaho*

Agricultural Experiment Station, University of Idaho

As a general rule, if sterility or partial sterility occurs in a female or two in a herd, it is not such a serious matter. However, when such a condition is associated with the herd sire it is much more significant. Such a specific case was recently brought to the writer's attention by a breeder of purebred swine who had a selected herd of ten tried sows which had been producing regularly litters of normal size, varying from seven to ten pigs.

A young boar of commendable individuality and apparently normal in every way was introduced into the herd and mated to

TABLE I.—*Farrowing record of sows for 1927 when mated to normal boar, and for 1928 when mated to Discount*

Sow	Pigs Farrowed Per Litter			
	Spring 1927	Fall 1927	Spring 1928	Fall 1928
1	7	8	6	
2	10	9	1	
3	10	8	3	
4	10	8	4	
5	9	10	5	
6	10	10	2	
7	9	7	1	
8	9	8	5	
9	10	9	2	3
10	9	10	5	2
Total pigs farrowed.	93	87	34	5
Average pigs per litter.....	9.3	8.7	3.4	2.5

all of the sows in the fall of 1927. During the mating season the boar was allowed to run with the sows in an eleven-acre field, one quarter-mile from their sleeping quarters. In the field the sows and boar had access to green forage in addition to some corn that they were "hogging off." During the gestation period the sows were fed field peas, corn and alfalfa hay. In the spring of 1928, the ten sows farrowed thirty-four pigs with litters varying from one to six pigs per litter (table I). Two of the sows were

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bred back to the boar for fall farrow. One of them farrowed two, and the other three normal pigs. During the breeding season and gestation period the sows and boars were in commendable condition.

The problem of nutrition is naturally of vital concern in avoiding deleterious effects on sexual physiology in the male as well as in the females.[1,2] In this case, however, inasmuch as green forage and corn were fed during the breeding season, and corn, field peas and alfalfa hay during the gestation period, it would seem that one might suspect some other source as the trouble. The pigs farrowed were normal in size and satisfactory in vigor, and comparable in these respects with pigs farrowed under the same plan of feeding and management which has worked out consistently satisfactory for a number of years in this state.

It is evident from table I that the sows were uniformly good producers when mated to the previous herd sire and that all of the litters were materially affected when mated to the young boar Discount. Discount was a very vigorous boar, weighing about 400 pounds. The manner in which he served would not give rise to any suspicion with respect to fertility. There are references available where boars of vigor and normal function have not been uniformly successful in settling their full quota of sows, and that those they did settle produced small litters.[3]

The owner of Discount made him available for examination at this station. His semen was submitted to the usual laboratory tests. The spermatozoa were studied for motility and vitality, and the hydrogen-ion concentration was determined. With the least possible delay (usually less than ten minutes) the fresh sample of semen was removed to the laboratory where suitable and equal amounts were drawn into each of three test-tubes which were placed under the following temperature conditions respec-

TABLE II.—*Comparative study based upon hydrogen-ion concentration and motility of spermatozoa in fresh samples*

Name or Number Boar	Samples Studied	pH Value	Total Motility (%)	Type of Motility (%)	
				Definitely Forward	Essentially Not Forward*
Discount	5	7.8–†	8	2	6
1	3	7.4+	99	98–	1–
2	3	7.4+	96	95	1
3	4	7.4+	98	95–	2–

*The spermatozoa not definitely forward-moving would move in a circle, revolve or display some other form of sluggish unprogressive action.
†Plus and minus values.

tively: 60°F., 75°F. and 95°F. The fresh sample was tested for motility and the pH value, both of which exert influence on the ability of the spermatozoa to perform their normal function.[8,9]

The pereent motility in the samples from Discount would vary from 5 to 12, with an average of 8 per cent for five samples. However, only 2 per cent were comparable in activity with the action evident in the almost perfect samples from the other boars. The pH value is decidedly high in the samples from Discount. While it is true that the colorimetric method, which was used here, is more approximate than the electrometric method of securing pH values, it nevertheless indicates sufficient difference to suggest an abnormal condition, inasmuch as spermatozoa, and living cells in general, require a rather specific hydrogen-ion concentration.

TABLE III.—*Vitality of semen from normal boars and from Discount under laboratory conditions*

TIME	60° F.		75° F.		95° F.	
	NORMAL	DISCOUNT	NORMAL	DISCOUNT	NORMAL	DISCOUNT
10:00 A. M.	98*	8	98	8	98	8
12:00 M.	85	2–	85	2–	80	2–
2:00 P. M.	75	1	70	1	70	1–
4:00 P. M.	60	1–	55	1–	50	trace
6:00 P. M.	40	1–	30	trace	20	0
8:00 P. M.	20	trace	15	0	8	
10:00 P. M.	10	0	3		trace	
9:00 A. M.	trace		0		0	
11:00 A. M.	0					

*In per cent.

In table III, a striking difference is indicated in the vitality of the normal and the abnormal samples. Rather a uniform reduction in vitality is noticed in the normal samples, while in the abnormal samples there was a decided change during the first two-hour period.[10] This may be explained on the basis of the condition of the fresh samples which showed only 2 per cent actively forward-moving and 6 per cent sluggish spermatozoa. Life in general persisted much longer in the normal samples. It will be noticed in table III that the lower temperatures were the most favorable to the vitality of the spermatozoa. It has been stated by another author[10] that "temperature seems to exert a greater influence upon the vitality of the semen than any other condition entering into the experiment." In this connection it may be well to bear in mind that contamination with bacteria in sampling is almost unavoidable, and, further, that the higher temperatures

are favorable to the development of such organisms. Throughout the experiments confirmation was made of the influence which the bacteria had upon the pH values. In the higher temperatures the reaction became increasingly acid with the progress of the tests. It is probable that it is in this way that temperatures ordinarily used in experiments of this nature exert a deleterious effect upon the vitality of the spermatozoa. In general, we place the blame on the females first, when irregularities of this nature arise. But it is well to keep in mind that possibilities of partial or total sterility in males is not uncommon even among young and apparently vigorous individuals.

ACKNOWLEDGMENT

Recognition is due Mr. H. C. Hansen, assistant in dairy manufacturing and Mr. C. C. Prouty, assistant bacteriologist, Experiment Station, for assistance in securing samples and making laboratory tests.

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PLANS FOR DETROIT

BIRD'S-EYE VIEW OF PROGRAM

	MONDAY AUG. 12	TUESDAY AUG. 13	WEDNESDAY AUG. 14	THURSDAY AUG. 15	FRIDAY AUG. 16
Morning	Meetings of Committees	Opening Session	Sectional Meetings	Sectional Meetings	Clinic
Afternoon	Meeting of Executive Board	General Session	General Session	General Session	Clinic
Evening	State Association Conference	Alumni Meetings. President's Reception	Banquet	General Session — Papers	

SEVENTY YEARS OF VETERINARY SERVICE IN THE UNITED STATES

By PIERRE A. FISH, *Ithaca, N. Y.*

Incidental to our work in assembling material for the "History of the Veterinary Profession in America," and as a part of the effort of the A. V. M. A. Committee on History, it has been our privilege to come into possession of some interesting details relating to the census reports of the profession.

The veterinarian is regarded as the unit of service and although the data relate to statistics, some illuminating conclusions may be drawn from them.

Our knowledge of veterinary service in the United States, prior to 1850, is very meager and seems to be attainable only by search for occasional references in the early American agricultural periodicals and foreign veterinary journals. The first official record of the number of veterinarians in this country is given in the seventh U. S. Census Report, for the year 1850. It is believed that the census reports of this early period contained some inaccuracies but they represent the only official records now available.

According to the 1850 report, there was a total of 46 veterinarians, limited to eight states of the whole country, distributed as follows: New York, 20; Ohio, 8; Massachusetts, 5; Indiana, 5; Illinois, 4; Virginia, 2; Vermont, 1; District of Columbia, 1. Each decade has shown an increase and for the sake of conciseness, the figures are given in table I.

TABLE I—*Census figures on veterinarians*

CENSUS	YEAR	VETERINARIANS	INCREASE %
7th	1850	46	
8th	1860	392	752.1
9th	1870	1166	197.4
10th	1880	2130	82.6
11th	1890	6494	205
12th	1900	8163	25.7
13th	1910	11652	42.7
14th	1920	13494	15.7

It may be noted from table I that the percentage of increase in the number of veterinarians shows a very decided falling off after 1890. This date represents the line of cleavage between

the lawless period, when practically no barriers existed to prevent anyone from practicing as a veterinarian, and the legal period when educational standards began to be required and a number of the states enacted laws regulating veterinary practice.

Various facts of great interest may be obtained from a study of these reports relative to the development of veterinary service in different sections of the country and, in the later reports, comparing the gain and loss in certain sections with other sections. In the earlier years, the veterinarians established themselves principally along the Atlantic Coast, from Virginia northward, and in the states bordering the Great Lakes, as far west as the Mississippi River.

In the census of 1850, it is interesting to note that nearly half of the veterinarians in the whole country were located in New York State and New York maintained the lead in veterinary population until 1910, with the exception of the year 1860, when Pennsylvania was listed with a majority of one veterinarian over New York. In 1910, Illinois took the lead, with New York second; in 1920, Illinois was still leading, with New York in fourth place.

Until 1910, the larger half of the total veterinarians was located in the Middle Atlantic (New York, New Jersey and Pennsylvania) and East North Central States (Ohio, Indiana, Illinois, Michigan, Wisconsin). In 1910, the Middle Atlantic States were displaced by the West North Central States (Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas). All sections of the country showed a gain in the number of veterinarians until 1910; at that time, and in 1920, only the New England and Middle Atlantic States showed a decline. Among the individual states showing a decline (1920), New York stood first, with a loss of 127 veterinarians.

Although the majority of the veterinarians is located in the North Central States, the rate of increase from 1910 to 1920 has been greater in the Southern States than in any other section. In North Carolina the number was trebled and in a number of other southern states the numbers were more than doubled. The tide of the veterinary population is apparently receding from the northeastern section of the country and increasing in the North Central States, and the South.

In the census of 1870, information was given relative to the nativity of the veterinarians as follows: Americans, 63.8%; British, 20.4%; German, 10.5%; scattering, 5.3%.

That the female veterinarian is a recent development seems to be contraindicated by the fact that in 1890 two were listed; in 1900, fourteen; in 1910, none, in 1920, one.

If, in 1850, there had been 48 states in the Union, only 46 of them could have been supplied with a veterinarian; two states would have been without veterinary service. On the basis of the 1920 report, an equal apportionment would have provided each state with 281 veterinarians and six of the states could have had an extra man. This represents the numerical growth of the profession in 70 years.

The six states containing the greatest number of veterinarians in 1910 maintained that honor in 1920 but there was a rearrangement of their order, as shown in table II.

TABLE II—*Relative positions of states in 1910 and 1920*

RANK	STATE	1910	RANK	STATE	1920
1	Illinois	1038	1	Illinois	1146
2	New York	981	2	Iowa	972
3	Ohio	782	3	Ohio	860
4	Iowa	692	4	New York	854
5	Pennsylvania	676	5	Indiana	754
6	Indiana	637	6	Pennsylvania	698

Iowa displaced New York and Indiana displaced Pennsylvania.

The report of the 1920 census was of particular interest, coming as it did soon after the close of the World War, in which approximately 20 per cent of the veterinarians participated. The present decade, with a reduced number of veterinary schools and a consequent lessened production of veterinarians, along with other factors affecting the profession, will give still greater interest to the report of the not-far-distant 1930 census.

Circulation

Our readers may be interested in knowing something concerning circulation figures for the JOURNAL. The following figures are for the six-months periods ending with the date given in each case and are *net*, according to sworn statement of the Business Manager:

December 31, 1926.....4009
June 30, 1927.....4073
December 31, 1927.....4190
June 30, 1928.....4328
December 31, 1928.....4472

Our printing order this month is 4850 copies. Enough said.

VIVA CUBA!

By N. S. Mayo, *North Chicago, Ill.*

It was a raw cloudy day, the last of February, when I left Chicago with its snow and ice. The next day, in northern Georgia farmers were plowing and, in southern Georgia, the peach trees were in bloom. The second morning, when I reached Miami, Florida, it was too warm for comfort. I called on my old friend, Dr. Schofield, who has a large small-animal practice and he showed me the town, including the famous Coral Gables. He told me how he bought a piece of property for $1500.00 and sold it for $50,000.00, then bought property he *could have sold* for $250,000 but did not. Then the boom burst and we draw the curtain.

Dr. Schofield likes to handle canine distemper. He uses large doses of anti-canine distemper homologous serum, injected intraperitoneally, and with the usual adjuvant treatment obtains excellent results. A very mild climate with lots of sunshine is also a favorable factor.

At Miami the hotels are filled with northern people, mostly old and fat, who sit and rock and gossip on the hotel verandas, "size up" new arrivals and scan the weather reports from the North—a strenuous existence.

From Miami, I traveled over the famous Florida East Coast Line that runs over the sea for miles on concrete bridges to Key West, where I took the boat for Havana. It rained most of the way, but just as we entered Havana harbor, it cleared and the grim old Moro Castle looked just as it did twenty-five years ago, when I first went to Cuba. The water-front of the city, however, has changed greatly. Old Spanish buildings have been removed, the shore filled in and they are continuing the beautiful Malecon shore boulevard clean around the city. An unfortunate change, however, is in the names of the streets. Old names that have continued for centuries are being replaced by the names of modern politicians. This makes it very confusing. Still the people use the old names. There is Obispo Street, so called because centuries past the bishop walked down the street frequently. Obrapia (pious work), but I do not know what the good deed was; Lamparilla, or "street of the little light," where ages ago some public-spirited subject of the Spanish crown kept a light burning to aid the public at night. However, Havana is now one of the

most beautiful cities of the New World and is swarming with tourists. More than 31,000 entered Havana in the month of February, each of whom contributed a head tax of $3.00 to the Cuban government besides what they spent at "Sloppy Joe's" bar and they all seem to flock there. I *looked in* only.

Drs. Crespo, Chief Veterinarian for the Department of Agriculture, and Castro took me to the Agricultural Experiment Station at Santiago de las Vegas, which I helped to organize and where I spent five interesting years. Dr. Castro has charge of an up-to-date anti-hog cholera serum plant and the government is building some fine modern buildings there. The old workmen

DR. MAYO VISITS CUBA

Dr. Machado, Director of the National Insane Asylum of Cuba, is on the extreme left. Dr. R. Castro, in charge of the Cuban anti-hog cholera serum plant, on the extreme right.

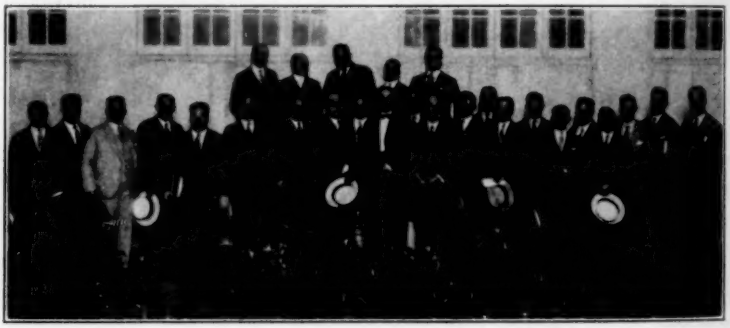
told me that Carolina, a fine American carriage mule that was seven years old when I went there in 1904, died last October, at the ripe age of 32 years. We also stopped to visit the National Insane Asylum, at Mozarra, in charge of Dr. Machado. Dr. Machado first graduated in veterinary medicine and later in human medicine and holds a high place in the medical profession of Cuba.

Through the kindness of Col. Luis A. Beltran, Chief of the Veterinary Corps, I visited the Cuban Army Remount and Breeding Depot, located some ten miles from Havana. This is just started but promises to be a model of its kind.

The veterinary service of the Cuban Army is an independent organization and, under the administration of Col. Beltran, has become so efficient that army veterinary officers have been detailed to supervise some civil departments of the government. (Many readers will remember meeting Col. Beltran with Dr. C. A. Arias at the Des Moines meeting of the A. V. M. A., in 1924.)

A special meeting of the Cuban National Veterinary Association was called by President Etchegoyhen to elect me an honorary member. My well-known natural modesty forbids my reporting the President's speech. It was an unexpected and unusual honor that I gratefully appreciate.

A number of Cuban veterinarians asked me, "Will not the A. V. M. A. hold an annual meeting in Havana?" I told them that I hoped so, and I am sure the members would vote for it if they only knew what a royal welcome they would receive. I am voting for it right now.



CUBAN NATIONAL VETERINARY ASSOCIATION

Flashlight photograph of members in attendance at the meeting held March 11, 1929. Taken in the patio of the Veterinary College.

Leaving Havana for Key West, we struck the roughest passage of the whole season. Of the 216 passengers, only five were not seasick and I was *not* one of the five. I reluctantly but promptly contributed to the denizens of the gulf stream some Cuban fruits I had eaten just before starting and then with cerium oxalate and bismuth compound got fairly well but I did not enter any charge on my expense account for dinner on the boat. It is only six hours from Havana to Key West and I was soon on my way through the flooded lowlands of Georgia to the North—but in memory still lingers the beautiful "Pearl of the Antilles," with its ancient tropical charm and generous hospitality.

RABIES CONTROL IN PORT-AU-PRINCE, HAITI

By I. B. BOUGHTON, *Port-au-Prince, Haiti, Veterinarian, Service Technique*

Prior to the establishment of a Veterinary Department in this country, in 1924, little if any attention had been paid to the diseases of animals, particularly dogs. The most important reason for this was the fact that up until that time a veterinarian was an unknown quantity in Haiti. Several quacks had been established for several years but their lack of knowledge made them more of a danger than a blessing to the live stock of the country. Superstition concerning the diseases of animals is rife throughout all parts of the Republic and treatments, bizarre beyond description, are seriously administered in the firm belief that such measures are the only cures for the disease under consideration. As an example, tapping the belly of a colicky horse three times with a slipper, saying a prayer and then making a cross on the belly of the sufferer are the measures necessary to relieve the animal.

PREVALENCE OF RABIES

Canine madness is prevalent in all parts of the country, particularly in the principal cities. Hordes of half-starved, vicious, stray dogs overrun the countryside, while the towns suffer no less from hundreds of strays which would be better off dead. The carcasses of dead animals are usually cleaned of all meat inside of a few hours by these scavengers, while the common practice of piling stones on the graves in the country cemeteries is necessary to keep the cadavers from being unearthed and eaten by the dogs.

At our various clinics, rabies is a common occurrence, sometimes three of four cases being presented for treatment. The average peasant knows absolutely nothing about rabies and, consequently, when his dog gets sick, he brings it to the clinic for treatment. The writer has several times seen the owner carrying a furiously rabid dog in his arms, paying no attention to the bites inflicted by the teeth of the insane animal. In one such case the owner refused to take antirabic treatment and still lives to tell the tale.

Besides dogs, we have had cases of rabies in cattle, horses, mules and hogs. The Haitian burro would seem to bear a charmed

Received for publication, April 6, 1929.

life, since, despite his numbers, we have never seen one that was rabid. Cases of human rabies are not uncommon, there having been four cases at the local hospital in the past two years.

A lack of regulatory ordinances and an insufficient veterinary personnel in all parts of the country allows the disease to go unchecked to a large extent. The ignorance and apathy of the public at large concerning the disease further complicates the situation; the common fallacy regarding the prevalence of the disease during the summer months is widely believed here, despite the fact that our summers are little, if any, hotter than the winters.

Types of the Disease

By far the great majority of the cases seen by the writer have been of the dumb type and the clinical picture follows that described in the standard texts. The course seldom lasts more than four days after the first symptoms appear. Melancholy, depraved appetite and throat paralysis, followed by a posterior ascending paralysis, comprise the principal signs.

The furious type is relatively rare as far as we are able to judge from clinical experience. The writer has remarked several times that the imported dog seems to be attacked by the furious type more often than the native cur. All the cases seen in cattle and horses have been typical book-pictures of the malady. The course seems to average about seven days in the horse and a day or so longer in cattle.

Regulations Concerning Rabies

In October, 1926, a law requiring the municipal licensing of all dogs was passed. This statute further provided that any dog on the street must be either muzzled or on a leash, and that all stray dogs were to be caught, held at the city pound for forty-eight hours and then destroyed if unclaimed by the owners.

The writer discussed the vaccination of dogs by the single-injection method with the authorities and convinced them that compulsory vaccination of all licensed dogs is a valuable and necessary part of any rabies-control program. Consequently, an amendment to the municipal ordinance was made, stating that all dogs must be vaccinated before they could be licensed. The charge was nominal and the work was done by representatives of this department, at the office at the Experiment Station and at the dog-license bureau in the city.

Rabies was made a notifiable disease by the Public Health Department and the local health officer notified the writer of every suspected case. Isolation quarters were provided at the pound, where all suspects were held for three weeks or until they had succumbed to the disease. All brains from animals dying in isolation were examined for Negri bodies at the local hospital and the public at large was asked to bring in the brain of any dog that had died showing any antemortem symptoms of rabies.

Wide publicity was given the entire subject in several of the local papers in order to inform the public of the importance of controlling the disease and also in an effort to secure their hearty cooperation. Prizes were offered to the dog-catcher who secured the greatest number of stray dogs. The people were asked to keep their dogs at home as much as possible in order to safeguard the children on the streets and to prevent any rabid animal from running amuck. This phase of the program was featured because of the large numbers of cab-horses and peasants' beasts of burden which are upon the streets at all hours of the day and night.

Results of the Campaign

During the fiscal year, October, 1926—September, 1927, we vaccinated a total of 367 dogs in this city. During the same period the brains of thirty-six dogs were sent to the laboratory of the General Hospital for microscopic examination for Negri bodies. Of this number, nineteen were positive under microscopic examination, while pressure of other duties and lack of facilities prevented the animal inoculation of material from the microscopically-negative brains. However, all persons exposed in any case where the slightest suspicion of rabies existed, despite negative microscopic findings, were advised to take the course of vaccination.

The total number of dogs vaccinated during that year does not represent more than a third of the total dog population of the city, at least in the writer's judgment. Ignorance of the serious character of the disease, negligence and unwillingness on the owner's part to subject his dog to vaccination are the principal reasons for the small number of dogs vaccinated.

At the city pound, 2,962 dogs were destroyed this year.

Of the total of 367 dogs vaccinated, two animals developed clinical rabies, which was substantiated by the finding of Negri bodies in the ganglion cells of Ammon's horn. One of these animals, a small French poodle, was vaccinated on October 27,

1926, and died from clinical rabies on June 29, 1927, after having bitten a small boy. At the time of vaccination no history of exposure was obtainable, the owner stating that the animal seldom left the house and rarely played with other dogs. Investigation at the time of death revealed the fact that the animal had a fight with a strange dog about ten days previous to the appearance of the symptoms (of the furious type), during which it was severely bitten. No trace of the other dog could be found.

The other dog was vaccinated on December 1, 1926, and developed rabies on February 11, 1927. The shortness of the time elapsed between vaccination and death coupled with the known variation in the length of the incubation period of the disease indicates the possibility of a pre-vaccination infection in this animal. While there was a possibility of other vaccinated dogs succumbing to rabies unknown to us, a careful check-up assured us that such cases had not occurred.

From October 1, 1927, until September 30, 1928, a total of 347 dogs were vaccinated in Port-au-Prince. During this time nineteen dog brains were examined at the General Hospital and twelve were found to be positive. At the city pound 370 dogs were destroyed during the fiscal year 1927-1928. No record of any vaccinated animals contracting rabies was obtained after a careful check-up.

Incidentally a unique and painless way of destroying the stray dogs was devised by the Public Health Officer. An air-tight box, large enough to hold five dogs and provided with a hole to accommodate the exhaust pipe of an automobile, was constructed. The dogs are placed therein, the exhaust pipe thrust into the hole, the motor started and the animals are dead within about three minutes.

Conclusion

The results of the first two years of rabies control work in this city are very encouraging. The fact that only two vaccinated dogs out of a total of 714 dogs treated contracted the disease indicates the practical field value of the single-injection anti-rabies vaccine. The writer is convinced, from the foregoing records, that no rabies control campaign is complete unless compulsory vaccination of all dogs is included.

Yes, the big meeting will be in Detroit, this year.
August 13-14-15-16.

BACTERIOLOGICAL CONTROL OF NUTRITION EXPERIMENTS RELATED TO THE ABORTION PROBLEM*

A competent pathologist should be included as an actual worker in a project which deals with nutrition experiments as related to the abortion problem. It is not sufficient to have this pathologist merely as an advisor or cooperator, but he or she should be actively concerned in the planning of the project and in carrying out all of the work in which bacteriological or pathological problems are concerned.

Animals with known histories should be used in these experiments. These individuals should come from herds which have clean records in respect to infection with *Bact. abortus* and such animals should have breeding histories which give no suggestion of abortion. If mature cows are used, previous breeding records should be noted with previous pregnancies, the number of services required for each pregnancy and the periods of gestation for each. The fetal membranes should be examined for any gross or microscopic pathology and the presence of *Bact. abortus* Bang should be ascertained by cultures and animal inoculation. Herd animals should be tested by the serological methods (complement-fixation and agglutination) for antibodies for *Bact. abortus* Bang. The blood serum should be examined serologically every thirty days and two tests should be made before the animals are placed on experiment. The titer of the serum of any animal used should be zero. Animals showing a titer at any time of 1-50 should be carefully watched and examined by other pathological methods to determine if they are infected with the organism. Guinea-pig inoculations should be made, as well as cultural tests, to determine the presence of the organism from any material suspected of containing it.

Care should be taken to eliminate animals which have any history of coming in contact or being infected with the other bacterial causes of abortion, namely *Vibrio fetus, Bacillus pyogenes,* streptococci, and other pyogenic organisms. The age, history, results of serological tests and physical examinations

*Report of the Sub-Committee of the Committee on Abortion of the National Research Council. The Sub-committee consisted of I. F. Huddleson, East Lansing, Michigan; J. M. Buck, Bureau of Animal Industry, Washington, D. C.; Alice C. Evans, U. S. Public Health Service, Washington, D. C.; and C. P. Fitch, University Farm, St. Paul, Minnesota, chairman. This report was adopted by the full Committee on Abortion of the National Research Council, at a meeting held in Philadelphia, Pennsylvania, September 17, 1927.

of the bull or bulls used should be carefuly noted. After conception has taken place the following should be noted:

1. Period of gestation.
2. Occurrence or absence of dystocia.
3. Time required for expulsion of fetal membranes.
4. A complete gross examination of fetal membranes and the tests carried out as noted above.
5. Condition of the fetus at the time of delivery and subsequent clinical history.
6. Following delivery, guinea pigs should be inoculated intra-abdominally with a suspension of cotyledons and uterine exudate. After five or six weeks the pigs should be destroyed and carefully examined bacteriologically for the presence of the organism. Cultures should be planted on suitable culture media. This need not be the same in all cases but great care should be taken to note that *Bact. abortus* Bang will grow on the particular media selected. Your committee uses serum-agar, liver-agar, or glucose-agar for this purpose. The cultures should be incubated at 37.5° C. in 10% CO_2 atmosphere. Usually two or three days is sufficient to obtain maximum growth.

We realize the above is merely an outline of certain of the requirements which we believe essential in work of this kind. Details are omitted and many points which will arise in connection with such experiments are not considered. This should be taken merely as an outline in connection with this work.

TECHNIC FOR THE PATHOLOGICAL EXAMINATION AND RECORDING THE LESIONS OF THE FETAL MEMBRANES OF THE COW

By E. T. HALLMAN, *East Lansing, Mich.*

Department of Animal Pathology, Michigan State College

This outline of the technic used in our laboratory for the study of fetal membranes has been prepared at the request of the Committee on Infectious Abortion of the National Research Council as a guide for those who are studying the genital diseases of cattle.

It is assumed that it was not intended to include in this outline bacteriological or histological technic, since these methods are more or less standardized. Neither is it an effort made to

enable the reader in interpreting alterations. This ability can come only from experience and study. What is needed is a technic that will enable the worker to record permanently his observations in a form that will help him to study and interpret them as experience is acquired. The most valuable data are to be obtained by a study of the consecutive membranes of the individual throughout her breeding life. If this is to be done, some method of recording the alterations in a form that can be compared with the alterations of subsequent membranes is highly desirable.

The membranes should be obtained with as little mutilation as possible. Our herdsmen are instructed to keep the parturient cow tied up until the membranes are passed. The examination should be made as soon after delivery as possible, although they may be held in the refrigerator one or two days without any appreciable gross changes, at times when it is impossible to examine them at once.

The parturition number of the cow, number of services required, duration of pregnancy, whether pregnancy occurred in right or left horn, normal parturition or dystocia and time required for expulsion of membranes should be recorded. If the fetal bag is partially or completely inverted, this fact should be recorded and the bag turned right side out. If the membranes are in two or more portions they should be placed in their proper positions. This may be done by matching the allantoic vessels. We find a cement floor a satisfactory place on which to lay out the membrane; a large table may be used. We open the allantoic sac with a pair of shears, following the course of the main allantoic vessel, and spread the membranes out with the placental surface upward. Any manure and straw are removed by washing with a gentle stream from a hose. The placental areas frequently contain considerable blood. This can be removed with water from a hose, thus rendering their examination more easy. The number, size and arrangement of the placental areas are noted. Each placental area is carefully examined for gross lesions, such as matting together of tufts of villi, calcification, necrosis of the villi either at the tip or base, or sloughing of the villi. These alterations can be clearly brought out by directing a gentle stream of water from a hose on the placental area. The condition of the interplacental areas of the allantoic chorion is noted. Record is made of edema, congestion and hemorrhage, thickening or necrosis, or other alterations. The allantoic vessels are examined for

alterations. The condition of the amnion and cord should be noted.

If the conditions of the membranes are such that a permanent record of them in their entirety is desired we have found a painted tracing to be more satisfactory than a photograph. For this purpose we have framed a glass 48 by 52 inches, to be placed over the fetal membranes. Usually this is not long enough to cover the entire membranes but it is about as large as one man can safely handle and it serves our purpose quite well. After that portion of the membranes under the glass is traced, the glass may be moved to the remaining portion. Over this glass we place a tracing paper. We have found Vellum tracing paper 42 inches wide, manufactured by the U. S. Blue Print Paper Co., Chicago, Ill., to be quite satisfactory. The paper comes in rolls of 42 yards in length and can be cut to any desired length. On this paper is traced the outline of the membranes, placental areas, allantoic vessels and areas of gross alterations. The tracing is now removed to a convenient place in the room, the glass removed from membranes and, with them spread out before us, the fine details of lesions may be worked in with colors. We find Rogers brushing lacquer quite satisfactory. It can be obtained in a variety of colors, it spreads easily and smoothly, and dries in a very few minutes, so that one color may be worked over another to bring out details of lesions. A little ingenuity will enable the worker to record the lesions in a way that will be easily recognized upon subsequent examinations. Notations may be made on the chart in ink or pencil to record unusual alterations, or to indicate the location of material obtained for bacteriological or histological examination.

These charts are rolled and filed in a cabinet made especially for them. They are but little more trouble and expense to obtain than a photograph, and must more valuable. They afford a permanent record of the size and relation of the various anatomical units and their alterations. They are of particular value in comparing with the fetal membranes of subsequent pregnancies of the same individual. They can be photographed for lantern-slides or reproduction to illustrate manuscripts.

Yes, the big meeting will be in Detroit, this year.
August 13-14-15-16.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

THE ISOLATION OF BACTERIUM PULLORUM FROM A EUROPEAN BULLFINCH (PYRRHULA EUROPA)*

By C. B. HUDSON *and* F. R. BEAUDETTE

New Jersey Agricultural Experiment Station, New Brusnwick, N. J.

Through the courtesy of Mr. B. S. Bowdish, secretary of the New Jersey Audubon Society, we have occasionally received specimens of dead birds for examination. The specimen which is the subject of this report was received April 2, 1928, and from its heart-blood and liver pure cultures of an organism were isolated.

According to Mr. Bowdish, the bullfinch had been purchased for a friend from a large importer in New York City. The bird seemed ordinarily healthy and bright, though quite wild and restless, jumping continually from one side of its cage to the other. The only abnormality that was noted was a difficulty in firmly gripping the perch from which it was reported to have fallen frequently. On the last occasion, it had been noticed just previously that the bird seemed rather drowsy. It slipped from the perch, fell on the floor, and died in a few minutes. Death occurred two or three days after the purchase of the bird.

Both cultures (heart-blood and liver) were alike in all respects and of usual aerogenic type of *Bact. pullorum*. They produced acid and gas in dextrose, mannite, galactose, xylose, mannose, rhamnose, trehalose and levulose. Acid, but no gas, was produced in arabinose. Neither acid nor gas was produced in fermentation tubes containing lactose, maltose, saccharose, amygdalin, soluble starch, melezitose, inositol, inulin, sorbite, adonite, dextrin, raffinose, salicin, dulcitol and erythritol.

Unfortunately, a *Bact. pullorum* immune serum of high titer was not available when this study was made. However, the serum of a naturally infected hen agglutinated the organism in question to the same degree that it did a known strain of *Bact. pullorum*. Pathogenicity tests were not made.

*Journal Series paper of the New Jersey Agricultural Experiment Station, Department of Poultry Husbandry. Received for publication, December 26, 1928.

The isolation of *Bact. pullorum* from a bullfinch is of considerable interest in view of the fact that, for a long time, at least, it was known to affect only the common domesticated fowl. Only recently Dalling, Mason and Gordon,[1] in England, reported on the isolation of *Bact. pullorum* from sparrows. A farmer had lost several chicks from bacillary white diarrhea, as shown by bacteriological examination. He also submitted a sparrow for examination which had been caught in the run in which chicks had succumbed. This bird showed evidence of diarrhea and from its liver a typical aerogenic strain of *Bact. pullorum* was isolated. The strain was agglutinated by a *Bact. pullorum* immune serum, and when a broth culture of the organism was fed to two day-old chicks, they developed typical bacillary white diarrhea and on autopsy yielded the inoculated organism.

A case of bacillary white diarrhea in turkeys was reported by Hewitt,[2] of Minnesota. The organism was recovered from two specimens submitted in May, 1927. It is interesting to note that in this case the turkeys were hatched in an incubator which had previously been used for hatching baby chicks. Here again the organism was typical of the aerogenic type, viz., acid and gas in dextrose, mannite and galactose, with no change in lactose, saccharose, maltose, dextrin and dulcite. One of two guinea pigs inoculated intraperitoneally with this organism died in ten days and from it the organism was recovered. On the other hand, the four rabbits similarly inoculated failed to show evidence of it. Two hens inoculated intraperitoneally also failed to react.

An unusual and very interesting case of *Bact. pullorum* infection in rabbits was recently reported by Olney,[3] in Nebraska. In all, 125 rabbits died out of a lot of 128 breeding animals in the course of about two weeks. A heavy loss was sustained also in the young stock, although none of the suckling rabbits were affected. Infertile eggs, which had been incubated eighteen days, had been mixed with a grain mash and fed to each of the rabbits about three or four days previous to the first death. Cultures obtained from the rabbits were typical of *Bact. pullorum* and were aerogenic. The organism, as well as blood from sick animals, was fatal to rabbits when given intravenously. An antigen prepared from the strain was agglutinated by a *Bact. pullorum* immune serum.

In the case of the turkeys the incubator undoubtedly served as the source of infection, and it appears fairly certain that the sparrows contracted infection from the yard which they visited.

That the rabbits contracted the disease from eating infected eggs there is no doubt. However, we have no clue as to the source of infection in the case of the bullfinch. It seems unlikely that infection was contracted after importation. One of us (F. R. B.) has examined hundreds of birds from New York City bird-stores and, although epizootics due to *B. aertrycke* are common, no other type of organism seems to be involved. Since the bird died two or three days after it was purchased, it is unlikely that the infection was contracted while in the hands of the last owner. For this to be the case it would have to be established that uncooked infected egg had been fed, but even in this instance, there would have to be a period of incubation. Hence it might be conjectured that the bird was infected prior to importation.

That the organism involved in the cases cited above is *Bact. pullorum* and not *Bact. sanguinarium* is supported by the fact that, in three cases at least, the strains were typically aerogenic and maltose-dextrin-dulcite negative.

There was a time when bacillary white diarrhea was thought to be a disease of baby chicks only, but after Jones[4] reported its occurrence in adult birds, others made similar findings. Similarly, fowl typhoid was considered as a disease peculiar to adult birds, but in recent years its occurrence has been noted in baby chicks by Beaudette,[5] Beach and Davis,[6] and others. To what extent fowl typhoid is capable of spreading to other species has not been accurately determined. The outbreak investigated by Lucet[7] affected turkeys and appears to have been fowl typhoid. This author claims that ducks, geese and pigeons are not affected. D'Herelle[8] agrees that geese are usually resistant, and Donatien et al[9] state that palmipeds have shown themselves to be refractory. These investigators include the turkey, guinea fowl and pea fowl among the susceptible species. With respect to these, Pfeiler and Roepke[10] do not mention the pea fowl but include the pheasant among the species susceptible in natural epizootics. Both turkeys and ducks are reported by Kaupp and Dearstyne[11] to be affected by fowl typhoid and teHennepe[12] has observed the disease in ducks. Pheasants, Coscoroba swans, grouse, sparrows, ring doves and ostriches are able to contract the disease according to Truche,[13] and she adds that ducks, geese and turkeys are more resistant than hens.

As far as the above reports are concerned, it is difficult to determine which diagnoses have been established by bacteriological methods. That the disease does occur in ducks, however,

seems to have been susbtantiated by teHennepe. Thus there seems to be some difference of opinion as to the incidence of typhoid among the avian species, but there is some evidence to support the belief that it is greater than ordinarily suspected. Likewise, bacillary white diarrhea may affect more species than are now suspected, or, as time goes on, new species may become subject to it. At any rate, investigators should not have any preformed ideas as to the distribution of these diseases, and should make a very careful examination of cultures isolated from various sources. It is important to know the distribution of these diseases, especially bacillary white diarrhea, because wild birds may play an important part in disseminating the infection, thus complicating the program of eradication.

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PARATYPHOID INFECTION IN CATS

By RICHARD DUFFICY FRIEDLANDER, *San Francisco, California.*

George Williams Hooper Foundation for Medical Research, University of California

The literature concerning paratyphoid infection in cats seems to be confined to only a few scattered observations. Mori[1] reports an organism isolated from an epizöotic among young cats, which apparently belonged to the paratyphoid B group, at least according to its cultural reactions, since no practical agglutination tests were performed. The organism, *B. caticida*, was pathogenic for guinea pigs, rabbits, white mice, pigeons, cats and hedgehogs.

Reichel[2] recovered an organism from an enzöotic among young

Received for publication, January 26, 1929

cats, which, on the basis of cultural characteristics, was placed in the paratyphoid group. The kittens were described as being very emaciated, with severe diarrhea. No agglutination tests were performed.

Krumwiede, Valentine and Kohn[3] describe the agglutination reactions of an organism of the paratyphoid B group isolated from a cat, which was decided to be *B. aertrycke.*

Savage and White[4] describe infection of kittens with *B. enteriditis, B. aertrycke* and *B. paratyphosus* B. The kittens showed no symptoms until shortly before death.

In this laboratory, between September 3 and September 10, 1927, four kittens died with external signs of severe emaciation. The antemortem symptoms were unobserved, due to the fact that the kittens were found only after death by the animal-keeper. At autopsy there were no striking lesions except hyperemia of the small intestine and a noticeable tumefaction of the mesenteric lymphnodes. The remaining organs appeared normal except for the usual postmortem changes.

An organisms was recovered from three of the cats which, on preliminary examination, did not ferment lactose or saccharose and produced colorless colonies on eosin-methylene blue agar.

From the first cat, this organism was recovered from the mesenteric lymph-nodes, intestines, liver and spleen. From the second cat, from the mesenteric lymph-nodes and intestines only, and from the third cat, from heart-blood, lung, liver, spleen and mesenteric lymph-nodes. Cultures from the fourth cat proved to be negative.

The sugar fermentation reactions of these organisms were identical and as follows:

Glucose	AG		Lactose	—
Maltose	AG	(in 24 hours)	Saccharose	—
Mannite	AG		Adonite	—
Galactose	AG			

The biochemical reactions were typical of the *B. paratyphosus* B group:

Lead-acetate agar was darkened in 24 hours, showing the presence of H_2S.

In Russell's double-sugar agar, the reaction was characterized by an alkaline slant, with acid and gas in the base.

In suitable media a positive reduction of nitrates to nitrites was produced, but no formation of indol.

Gelatin was not liquefied.

Brom-cresol-purple milk was slightly acid the first day, but the reaction changed to alkaline on the fourth day.

The serological reactions are shown in table I.

TABLE I—*Serological reactions of organisms recovered from cats.*

CAT	CULTURE	ANTISERUM					
		B. ENTERITIDIS (1:2000)	B. AERTRYCKE (1:5000)	B. PARATYPHOSUS B (NEWPORT V) (1:3200)	B. PARATYPHOSUS B (MUTTON) (1:1600)	B. PARATYPHOSUS B (MOUSE. TYPE 106)	B. PARATYPHOSUS B (G. P. STRAIN MIXED)
1	Mesenteric lymph-node	1:160	1:640	1:160	1:40	1:160	1:20
	Intestine	1:80	1:320	1:160	1:40	1:40	—
	Spleen	1:160	1:640				
	Liver	1:160	1:640				
2	Mesenteric lymph-node	1:160					
	Intestine	1:160	1:640				

All agglutination tests were set up with the necessary controls, incubated for 2 hours at 55°C. in the water-bath and allowed to stand overnight in the incubator before a final reading. In the above agglutination reactions, the supernatant fluid was not clear in any case and the clumps were granular. It was deemed advisable to perform the following absorption tests with the serum which agglutinated the organisms to the highest titer, namely, *B. aertrycke* (original guinea-pig strain).

Aertrycke antiserum (1:5000) was absorbed with the strains from the mesenteric lymph-node and intestine of cat 1. The absorbed antiserum was then agglutinated against its homologous antigen.

(1) The antiserum absorbed with strain from the mesenteric node agglutinated its homologous antigen to a titer of 1:560 complete.

(2) The antiserum absorbed with the strain from the intestine agglutinated its homologous antigen to a titer of 1:560 complete.

It may now be said that, although these organisms are definitely members of the paratyphoid group, they are distinct

from any of the strains in this laboratory from a serological standpoint.

In order to determine more completely the identity of each organism from the various organs, an antiserum was prepared in the usual way from a typical strain isolated from the mesenteric lymph-node of cat 1. All the strains from cats 1 and 2 were agglutinated to a titer of 1:10,000 (the titer of the antiserum). This definitely established the fact that both cats 1 and 2 were infected with the same organism.

The situation was different with cat 3. At the time the previous agglutination tests were performed, this kitten had not died. After death, antigens were prepared from the organism in the heart-blood and spleen and these were agglutinated with *B. aertrycke* antiserum (1:5000) as follows:

Culture	*Titer*
Heart-blood	1:640
Spleen	1:640

The clumps were floccular, but the supernatant fluid was not clear. It was thus thought at the time that this cat was infected with the same organism as the previous cats. But agglutination reactions with the antiserum (1:10,000) prepared from the organism infecting cats 1 and 2 showed this to be wrong:

	Culture	*Titer*
Cat 3	Heart-blood	1:40
	Spleen	1:40

The supernatant fluid was not clear and the clumps were granular. Since these organisms were evidently different from those infecting cats 1 and 2, rabbits were immunized with an antigen prepared from the organisms recovered from the heart-blood of cat 3. The following serological tests were performed with the antiserum (1:10,000) thus obtained.

Culture	*Titer*
B. aertrycke	1:640
Intestine (cat 1)	1:160

The supernatant fluid was apparently clear and the clumps flocculo-granular. This then corroborates the findings that cats 1 and 2 were not infected with the same organism as cat 3 and also that none of the cats were infected with the Hooper strain of *B. aertrycke*.

Conclusions

Two organisms were recovered from three of four cats that died from a spontaneous virus-like disease. Culturally they definitely belong to the *B. paratyphosus* B group and are probably secondary invaders accompanying the virus infection. The paratyphoid cultures differ serologically from one another and from all other strains available in this laboratory.

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ULCERS IN STOMACHS OF RANCH FOXES

By J. E. Shillinger, *Washington, D. C.*

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During the month of November, 1928, a fox ranch in Ohio reported to the Biological Survey the loss of a number of animals. Inquiry revealed the fact that two foxes had been found dead within a short time after having been seen apparently normal. These deaths were believed to have been due to a digestive disturbance, and a prescription designed to serve as a mild laxative and intestinal antiseptic had been supplied by a veterinarian in that vicinity.

Five days subsequent to the first losses, several others occurred, and during the course of nine days, thirteen valuable animals out of a herd of seventy had died. One more died a week or ten days later. When an opportunity was presented for making an investigation, eight dead foxes were on hand. The owner described all the deaths as being sudden. Symptoms were seldom observed and when noted they were those of depression, weakness and collapse. No convulsions were seen.

Necropsy performed on the eight available animals showed in each instance a perforating gastric ulcer, a little more than 0.5 centimeter in diameter, invariably located in the posterior wall of the stomach somewhat closer to the pyloric end than the cardia, but not in the pylorus. The usual picture of a gross leakage of stomach contents into the peritoneal cavity was present. A narrow zone of inflammation existed around the perforations, and the mucosa of the stomachs showed patches of mild inflammation. Other than this, no pathological condition

*Received for publication, January 17, 1929.

could be observed macroscopically. The intestinal contents were limited in quantity, but aside from the admixture of small amounts of blood they appeared normal.

A fruitless search in the feed supply was made for some irritating mechanical substance that might account for the trouble. The food materials also were studied, but no particularly unusual quality in the diet of these foxes was found. No evidence of disease could be traced in the horses that had been slaughtered to furnish the meat portion of their ration, and the meat when examined was in a good state of preservation. No paint or disinfectant had been applied to the premises recently. Several of the animals dying had been on this ranch only six weeks, and no deaths were reported on the ranch from which they originated.

In the absence of any other clue as to the causative agent of this unusual condition, an attempt was made to isolate a pathogenic organism, but this was done under great difficulties and without success. Following the work done by Rosenow and Sanford,[1] on the bacteriology of ulcers of the stomach and duodenum of man, it appears possible that the agent may have been a specific infectious organism. Likewise the finding of duodenal ulcers in infants in epidemic form by Helmholz,[3] and their later description by Gerdine and Helmholz[3] as an infectious disease, offers the most plausible explanation of the condition encountered.

The elective localization of streptococci has been described by Rosenow[4] and the preference of various organisms for certain tissues for growth is well known. All of the conditions noted in this outbreak of perforating gastric ulcers of foxes resembled those of an acute infectious disease.

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A SAND-LADEN LIVER IN A HOG*

By FRANK P. MATHEWS, *Lafayette, Ind.*

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The liver herein described was detected in a well-nourished hog weighing about 250 pounds. As no other lesions were found, the remainder of the carcass was passed for food.

*Presented to the laboratory by Dr. J. M. Jehle.

The liver was quite firm to the touch and weighed 3340 grams. Imbedded within each lobe was one or more cigar-shaped masses which were easily palpated and slightly elevated above the surrounding tissue. Each mass converged towards the gall-bladder from the outer border of its respective lobe, thus suggesting greatly distended bile-ducts. The gall-bladder was approximately normal in size, but upon incision was found to be about one-third filled with sand. Incision into the cigar-shaped masses revealed their contents to be firmly packed sand, surrounded by a thick, connective-tissue wall. The largest of

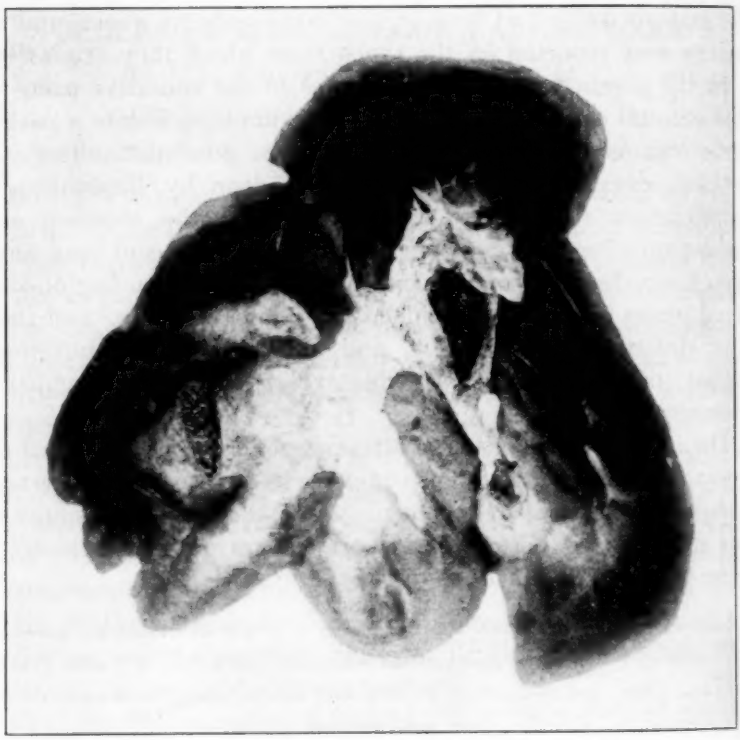

FIG. 1. The white streaks in the liver show the course taken by the sand-filled cavities.

these structures was five inches long and two and one-half inches at its greatest diameter. A short, constricted passage connected each cavity with the lumen of the gall-bladder. The sand weighed 855 grams or 26 per cent of the total weight of the liver. Gall-stones of various sizes were encountered in bile-ducts just prior to their entrance into the sand-filled cavities.

The microscopic changes in the least involved portions of the

liver consisted of a slight fatty infiltrative degeneration and a pronounced cirrhosis. Sections taken from the walls surrounding the sand exhibited a connective tissue proliferation and a round-cell infiltration. These connective tissue walls were lined by a mucous membrane, the inner portion of which showed considerable erosion and necrosis. The deeper portions presented easily recognized crypts, with an epithelial lining which was similar in all respects to the mucous membrane of the normal gall-bladder.

The presence of what must have been a well-developed mucous membrane suggests the possibility of a metaplastic, bile-duct

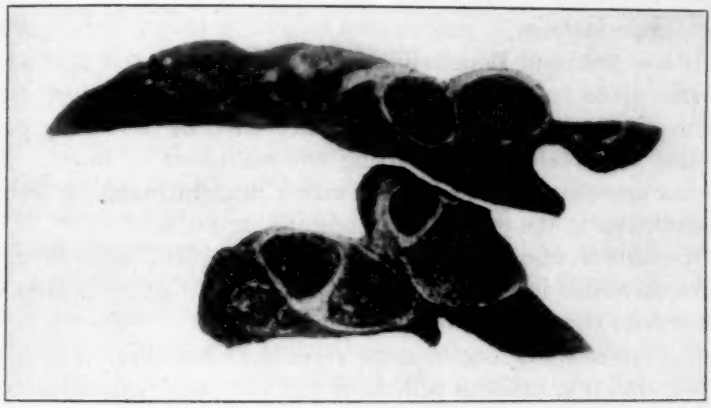

FIG. 2. A cross-section of the liver and its sand-filled cavities.

epithelium, or more probably a disturbance of development, resulting in supernumerary gall-gladders which for some reason became filled with sand. The opinion of Huytra and Marek that this unusual phenomenon is due to the eating of dirty food leaves much to be explained concerning its primary, etiological factor. An examination of the sand showed that it was the same as that which might be picked up with the food whenever hogs are fed upon sandy soil.

CENTRAL PENNSYLVANIA VETERINARY CLUB

At the annual meeting of the Central Pennsylvania Veterinary Club, held at Selinsgrove, Pa., in February, the following officers were elected for the year: President, Dr. J. G. Bailey, Milton; vice-president, D4. L. A. Peterson, Lewistown; secretary-treasurer, Dr. G. M. Leighow, Danville.

ABSTRACT

THE POSITION OF PARA-ABORTUS AND PARA-MELITENSIS STRAINS IN THE GENUS BRUCELLA*

By I. FOREST HUDDLESON *and* MYRTLE JOHNSON

Department of Bacteriology and Hygiene, Michigan State College, East Lansing, Mich.

The actual status of para strains of *Brucella* has been a subject for considerable speculation since Negre and Raynaud in 1912 discovered such a strain and differentiated it on the basis of its inagglutinability.

It was not until Boncinelli, in 1927, demonstrated that such strains could be quite easily produced in the laboratory that their position became known. He succeeded in producing para strains by repeatedly transferring *Br. melitensis* in broth. By such a procedure, strains became either inagglutinable or feebly agglutinable in the presence of a specific serum.

We have confirmed the findings of Boncinelli and, further, have succeeded in producing para strains from many strains of *Br. abortus* (Bang) and *Br. suis* (Traum).

If a strain of the organism be repeatedly transferred in liver broth until it grows as a pellicle, it will no longer agglutinate or absorb specific agglutinations as does the original strain. If the transferring be continued in broth, the strain becomes spontaneously agglutinable in saline solution and in non-specific serum. This phenomenon has been previously observed to occur by many investigators who have worked with para strains.

Para strains may be isolated from a broth-blood culture of the organism from human cases of undulant fever, if the culture be set aside for several days until a film or pellicle of growth appears on the surface of the broth. The growth from the seeding of the film on solid medium will be found to agglutinate in a much lower titer than the first growth taken from the blood culture.

Laboratory animals respond very slowly to the production of specific agglutinins on inoculation. In fact no demonstrable agglutinins are produced in the guinea pig, rabbit or cow from the injection of one agar slant of a living culture of a spontaneous

*Read before the 34th annual meeting of the Michigan Academy of Science, Arts and Letters, Ann Arbor, March 14-16, 1929.

agglutinable strain. Active infection with characteristic macroscopic lesions may be produced in the guinea pig with virulent spontaneously agglutinable strains without the production of demonstrable agglutinins.

By using a non-virulent, spontaneously agglutinable strain, an opportunity is afforded for immunizing cattle against Bang's abortion disease without the production of agglutinins, the presence of which causes confusion in the minds of the breeder when the animals are later tested for the presence or absence of infection by the agglutination test.

The non-agglutinin-producing, non-virulent strain is now being studied to determine its immunizing capacity.

The Non-Graduate Viewpoint

At the meeting of the Arkansas Veterinary Examining Board, held in Little Rock, January 25, 1929, two non-graduates presented themselves for examination but failed by a large margin to make the necessary grade. Another candidate forwarded six sets of questions, which he answered for himself, stating that he was ill and he asked that the Board consider this as an examination. His request was respectfully declined, according to Dr. Joe H. Bux, secretary of the Board, who reports that some of the answers given by the three applicants were unique and facetious. For example, it was stated that measles in swine yields to regular dipping and causes a skin eruption in man; that cesarean section is a diseased section; that papilloma of the mouth is due to ulcers produced by strong medicine. A request for drawings illustrating the bacteria of tetanus, anthrax and diphtheria produced most unusually shaped and very interesting organisms which would be maddening to a bacteriologist to classify.

Publicity Bureau For Kentucky

The Kentucky Veterinary Medical Association recently organized a Publicity Bureau, very much similar in scope and function to the publicity and policy committees of other state veterinary associations. The following constitute the Bureau: Drs. J. A. Winkler, Newport; J. R. Stifler, Frankfort; T. P. Polk and A. J. Steiner, Lexington. It is expected that the Bureau will prove to be of great benefit to the profession in the Blue Grass State.

ARMY VETERINARY SERVICE

CHANGES RELATIVE TO VETERINARY OFFICERS

Regular Army

The promotion of each of the following-named officers is announced:

Lt. Col. Wm. A. Sproule to colonel, Jan. 27, 1929.
Lt. Col. Walter Fraser to colonel, Jan. 29, 1929.
Captain Sherman R. Ingram to major, March 1, 1929.

Captain C. S. Williams reported to Fort Reno, Oklahoma, March 4, 1929, after a tour of foreign service in Hawaii.

Captain Burlin C. Bridges is relieved from duty at Fort Riley, Kans., effective on or about September 5, 1929, and directed to report to the Commandant, The Cavalry School, for duty as student.

Captain Raymond T. Seymour is relieved from further duty at Fort Hoyle, Md., and assigned to Fort Snelling, Minnesota, for duty.

Captain John McConeghy is relieved from duty at the U. S. Military Academy, West Point, N. Y., on or about August 20, 1929, and directed to report at Fort Robinson, Nebr., for duty.

Orders on Major Harold E. Egan are amended so as to assign him to duty at Fort Sill, Oklahoma, upon completion of his present tour of foreign service, instead of Fort Ethan Allen, Vt.

Captain Ralph B. Stewart is relieved from duty as student at the Cavalry School at the completion of his present course of instruction and assigned to duty at Fort Riley, Kans.

Reserve Corps

Promotions

Martien, Henry D. to Lt. Colonel..4054 Powelton Ave., West Philadelphia, Pa.
Salley, Raymond R. to 1st Lieut..P. O. Box 138, Orangeburg, S. C.
Burke, John Warden to 1st Lieut...Div. of Health, Dayton, Ohio.

New Acceptances

Diller, Oscar A.....Captain....720 S. San Joaquin St., Stockton, Calif.
Miller, Fred H.....2nd Lieut...210 McIndoe Street, Wausau, Wis.
Sarde, Robert M.....Captain....Camden, Del.

Four Veterinarians Wanted

The City Service Commission of Baltimore, Md., will hold tests beginning May 15, 1929, for the purpose of establishing a list of eligibles from which vacancies in the class of veterinary inspectors will be filled. At the present time there are four vacancies in the Health Department. Applicants must first pass a physical examination. Veterinarians are required to be graduates of institutions of recognized standing and must have had at least two years experience in veterinary postmortem and field work. The age limits are from 25 to 50 years and the entrance salary is $2500 with an annual increase of $100 until the maximum of $2800 is reached. Veterinarians interested in these positions must file applications with the City Service Commission, City Hall, Baltimore, Md., not later than the afternoon of May 14.

MISCELLANEOUS

ALLIED LABORATORIES, INCORPORATED

During the past month, announcement was made through the daily press of the organization of Allied Laboratories, Inc. Five of the country's largest producers of anti-hog cholera serum and other veterinary biological and pharmaceutical products have been brought under one directing head. The five companies joining to form the new organization, all well known to the veterinary profession, are Pitman-Moore Company, of Indianapolis; Royal Serum Company, of Kansas City; Sioux City Serum Company, of Sioux City, Iowa; Sioux Falls Serum Company,

DR. EDWARD A. CAHILL

of Sioux Falls, South Dakota; and United Serum Company, of Wichita, Kansas.

Administrative offices of the new corporation have been established at 310 South Michigan Avenue, Chicago, and will be under the direction of Dr. Edward A. Cahill, who has been elected president of the Allied Laboratories, Inc. Dr. Cahill has already moved to Chicago from Indianapolis, where, for several years, he was Director of the Pitman-Moore Biological Laboratories and Vice-President of that firm.

Dr. Cahill has been prominently identified with the veterinary profession for a score of years and has a wide acquaintance among

veterinarians throughout the United States and in many foreign countries where he has traveled extensively during recent years. He has served the American Veterinary Medical Association as chairman of the Section on Sanitary Science and Police (now Sanitary Science and Food Hygiene) and as chairman of the Committee on Policy. Before joining the Pitman-Moore organization, in 1918, he was Director of Disease Control Work for the Massachusetts Division of Animal Industry. Dr. Cahill was graduated from the University of Pennsylvania in 1909 and was engaged in general practice at Canonsburg, Pennsylvania, for several years, before he was called into the state service in Massachusetts. He took postgraduate work in bacteriology and pathology at Harvard University at about this time.

Other officers of Allied Laboratories, Inc., have been elected as follows: Mr. James E. Bartlett, president of Pitman-Moore Company, is chairman of the Board of Directors. Mr. S. F. Cusack, vice-president of the Sioux City Serum Company, is executive vice-president. Dr. H. E. Curry, manager of the Royal Serum Company, and Mr. Otis P. Garrison, president of the Sioux Falls Serum Company, are vice-presidents. Mr. Fred P. Hall, general manager of the Sioux Falls Serum Company, is secretary, and Mr. W. F. Gilchrist, president of the Sioux City Serum Company, is treasurer.

As stated in the formal announcement made by the new organization, the five old-established companies have joined together for the purpose of effecting greater economy in the production and distribution of veterinary products; the standardization of the quality of these products; the development of increased facilities for conducting research work in animal diseases; and more effective cooperation with the veterinary profession through stimulating the demand for its service and the improvement of facilities for serving the profession.

Two of the first projects to be undertaken by the new corporation are the establishment of a fully equipped experimental and research department and an extensive advertising campaign, in which the country's needs of competent veterinary services will be strongly stressed. The value of veterinary service to raisers of live stock everywhere will be the keynote of this campaign which, under the direction of Mr. Frank V. Hawkins, who directed the advertising campaigns formerly conducted by Pitman-Moore Company, will be carried in many of the leading farm papers of the country.

Each of the constituent companies in the new corporation will continue to operate as an independent unit and without change in its own directing personnel. Each company will continue to market its own products under its own label and will continue to be represented by its own corps of field representatives.

PROGRAM FOR STUDYING ABORTION DISEASE

A program of fourteen points in investigations of infectious abortion of live stock was outlined by Dr. John R. Mohler, chief of the Bureau of Animal Industry, U. S. Department of Agriculture, before the Abortion Committee of the National Research Council, in Chicago, early in December. Losses estimated at fully $50,000,000 annually have caused this disease to be the dread of live stock owners, particularly dairymen, and have challenged the ability of scientific investigators to develop improved control methods.

The Bureau of Animal Industry, said Doctor Mohler, is carrying on experiments and field investigations described as follows:

1. Experiments to determine the value of abortion vaccines.
2. The development of an improved vaccine safe to use even on pregnant animals.
3. Determination of the immunity afforded by vaccination.
4. The best age at which to vaccinate.
5. Determination, through field investigations, of the feasibility of combating the disease by eliminating or segregating affected animals, based upon the results of the agglutination tests.
6. Determining the practicability of developing a clean herd from an infected one by protecting the progeny from infection, and ascertaining the best method of handling herds to reduce losses while herd immunity is developing.
7. Determination of the best methods of limiting infection and reducing exposure in infected herds where more drastic means of control are impracticable.
8. Determining practical means of keeping abortion-free herds from becoming infected.
9. Studies to determine the part which other infections and factors play in the abortion problem.
10. Studies to determine whether deficiencies in certain vitamins and minerals tend to render animals more susceptible to infection with the abortion bacillus.
11. Determining whether there are other channels of infection than those commonly recognized, and their relative importance.
12. Studies of the reduction of milk-flow of cows whose udders carry the abortion bacillus, compared with cows that are abortion-free.
13. Experiments in the elimination of udder infection.
14. Studies of the virulence and other characteristics of different strains of the abortion bacillus.

In discussing the practical and scientific aspects of the problem, Doctor Mohler said, "It seems almost certain that abortion losses are to a great degree preventable and will eventually yield

to investigation." He suggested that in addition to the federal investigations outlined, work should be undertaken by a number of qualified institutions with the cooperation of the National Research Council and the department. Proper coordination of the work, he believes, would prevent waste and repetition, at the same time allowing each investigator to deal with his chosen problem in his own way.

Crude Petroleum Best Dip for Hogs

Dr. Marion Imes, of the U. S. Department of Agriculture, has thoroughly revised Farmers' Bulletin No. 1085-F, "Hog Lice and Mange, Methods of Control and Eradication." Among other things, Dr. Imes states that crude petroleum, preferably the unprocessed natural oil, is the most satisfactory dip for ridding hogs of lice and the sarcoptic or common mange. The demodectic or follicular mange is less common, but more serious when it does occur, according to Dr. Imes, who goes on to say that, although frequent dippings in crude petroleum check the progress of the disease, the only advisable course is to kill the animals that do not respond to treatment and to fatten the remainder of the herd for market, thereby disposing of all the animals. Then the premises should be thoroughly cleaned and carefully disinfected before restocking.

Dipping is the most effective method of eliminating lice and mange when either of these conditions is present in a herd. A wallow made of concrete with shallow water for the hogs is a good preventive. Dr. Imes recommends the using of clean water until the hogs become accustomed to the wallow. Then add petroleum for a day or two and return to clean water. Hand applications, spraying and hog-oilers are less effective than dipping or medicated wallows, but these may be necessary in winter when it is not practical to dip. Lime-sulphur dips are somewhat less effective than crude petroleum and require considerably more work. In addition, the lime-sulphur solution should be warmed before it is used for dipping. The petroleum dip is used at ordinary temperatures.

Copies of the bulletin may be obtained free of charge by applying to the U. S. Department of Agriculture, Washington, D. C. Plans for the construction of economical and effective wallows and dipping-vats are included in the bulletin.

AMERICAN VETERINARY MEDICAL ASSOCIATION

Financial Report—Dr. M. Jacob, Treasurer
December, 31, 1928

Bank balances, December 31, 1927			$ 5,159.03
Receipts, January 1, 1928, to December 31, 1928, (as per statement)		$33,083.97	
Liberty Loan Bonds redeemed		10,000.00	
			43,083.97
			48,243.00
Expenditures, same period, as per statement			36,587.37
			11,655.63
Placed on time deposit	Journal Fund	$ 3,080.65	
	Relief Fund (interest)	86.12	
	Schmidt Memorial Fund	282.00	
	A. V. M. A. Fund	2,500.00	
			5,948.77
Amount of cash in checking accounts, December 31, 1928			5,706.86
Revolving fund in hands of Dr. Hoskins			500.00
Amount of cash, exclusive of time deposits			6,206.86
Cash on time deposit, December 31, 1927		$15,015.89	
Added during period	Journal Fund	$ 3,080.65	
	Relief Fund	86.12	
	A. V. M. A. Fund	2,500.00	5,666.77
Total amount now on time deposit			20,682.66
Total cash resources			26,889.52
Bonds (purchase price)			15,330.95
Total assets, December 31, 1928			42,220.47
Total assets, December 31, 1927			45,710.12
Decrease for period			3,489.65

Consolidation of Relief Fund with A. V. M. A. Fund

Fund	Cash	Bonds	Time Deposit
A. V. M. A.	$ 3,275.70	$ 3,841.68	$ 2,500.00
Relief		1,980.26	729.35
Totals	$ 3,275.70	$ 5,821.94	$ 3,229.35

Distribution of Assets

Fund	Cash	Bonds (Cost)	Time Deposit	Totals
A. V. M. A.	$ 3,275.70	$ 5,821.94	$ 3,229.35	$12,326.99
Journal	2,931.16	9,509.01	17,453.31	29,893.48
Totals	$ 6,206.86	$15,330.95	$20,682.66	$42,220.47

A. V. M. A. Fund

Bank balance, December 31, 1927	$ 815.57	
Less old checks cashed	285.69	
		$ 529.88
Revolving fund in hands of Dr. Hoskins (see 1927 report)		500.00
Receipts during period (as per statement)		18,986.75
Total		$20,016.63
Expenditures during period (as per statement)		13,958.93
Balance		$ 6,057.70
Transfer to Schmidt Memorial Fund		282.00
Balance		$ 5,775.70
Placed on time deposit		2,500.00
Balance		$ 3,275.70
Revolving fund in hands of Dr. Hoskins		500.00
Balance		$ 2,775.70
Actual bank balance, December 31, 1928	$ 3,030.17	
Less checks not cashed	254.47	
Balance	$ 2,775.70*	

Journal Fund

Bank balance, December 31, 1927	$ 5,361.33	
Less old checks cashed	732.18	
		$ 4,629.15
Receipts during period (as per statement)		24,011.10
Total		$28,640.25
Expenditures during period (as per statement)		22,628.44
Balance		$ 6,011.81
Placed on time deposit		3,080.65
Balance		$ 2,931.16
Actual bank balance, December 31, 1928	$ 3,627.13	
Less checks not cashed	693.97	
Balance	$ 2,931.16	

Relief Fund

Amount of time deposit, December 31, 1927		$ 643.23
Interest on time deposit during period		26.98
Interest on $2,000 bonds		59.14
Total cash		$ 729.35
Less loan repaid to A. V. M. A. Fund		100.00
Balance		$ 629.35
Transferred to A. V. M. A. Fund to close account		629.35

Schmidt Memorial Fund

Amount on time deposit, December 31, 1927		$ 719.32
Received from Secretary	$ 282.00	
Interest on time deposit	13.75	
		295.75
Total		$ 1,015.07
Check to Dr. H. Jensen, April 10, 1928	$ 403.50	
Check to Dr. H. Jensen, June 4, 1928	611.57	
		1,015.07

*A. V. M. A. Fund still owes Journal Fund $2,000.00.

Salmon Memorial Fund

Amount on time deposit, December 31, 1927		$ 5,620.55
Liberty bond (face value)		500.00
		$ 6,120.55
Receipts:		
Interest on time deposit	$ 6.72	
Interest on Liberty bond	21.25	
Interest on 1st mortgage bonds, January 1, to July 1, 1928	151.25	
Rebate—Commission on bonds, by City National Bank	13.75	
		192.97
Total		$ 6,313.52
Less check to Erle R. Carter, September 22, 1928		150.00
Balance		$ 6,163.52
Invested as follows:		
Fidelity Trust Company, 1st mortgage bonds	$ 5,500.00	
U. S. Liberty Bond (face value)	500.00	
Amount on time deposit	163.52	
Total		$ 6,163.52

Bond Recapitulation

Fund	Par	Cost
A. V. M. A.	$ 6,000.00	$ 5,821.94
Journal Fund	10,000.00	9,509.01
	$16,000.00	$15,330.95

Receipts from Secretary

Monthly Receipts—Dr. H. P. Hoskins (A. V. M. A. and Journal Funds)

1928	
Jan. 19	$ 3,864.56
Feb. 21	5,024.66
Mar. 17	2,761.10
Apr. 18	2,069.48
May 18	1,498.52
June 18	2,335.70
July 20	2,041.13
Aug. 21	1,859.54
Sept. 17	1,885.99
Oct. 18	1,126.27
Nov. 17	1,578.21
Dec. 19	5,068.68
Sept. 22 Second Liberty Loan bond redeemed (A. V. M. A.)	10,000.00

Interest

June 19	Time deposits—Journal Fund	$ 287.45
June 19	Time deposits—Relief Fund	12.86
July 16	Bonds—A. V. M. A. Fund	412.44
July 16	Bonds—Journal Fund	294.60
Sept. 22	Bonds—A. V. M. A. Fund	106.25
Sept. 22	Bonds—Journal Fund	106.25
Sept. 22	Bonds—Relief Fund	59.14
Dec. 29	Bonds—A. V. M. A. Fund	191.91
Dec. 29	Bonds—Journal Fund	191.91
Dec. 29	Time deposits—Journal Fund	293.20
Dec. 29	Time deposits—Relief Fund	14.12
Total Receipts		$43,083.97

Disbursements

January 1 to December 31, 1928

A. V. M. A. Fund

1928			
January	10	Lyford M. Moore, Secretary's bond	$ 25.00
January	10	Hazen, Lindsday & Carroll, Treasurer's bond	175.00
January	10	The Schiffer Printing Co., stationery	27.50
January	10	Book Bldg., Inc., rent for January	223.00
January	10	The Schiffer Printing Co., stationery	121.75
January	10	Dr. H. P. Hoskins, miscellaneous	37.64
January	21	Horse Association of America, dues	50.00
January	21	Dr. H. P. Hoskins, traveling expenses	51.17
January	21	Dr. R. S. MacKellar, traveling expenses	129.42
January	28	Dr. H. P. Hoskins, salary for January	416.67
January	28	Una Anderson, salary for January	120.00
February	4	Dr. H. Preston Hoskins, traveling expenses	115.33
February	4	Dr. Reuben Hilty, traveling expenses	56.05
February	4	Dr. B. T. Simms, traveling expenses	104.52
February	4	Reindel & Co., office furniture	70.50
February	4	Dr. Reuben Hilty, traveling expenses	79.70
February	4	Dr. H. P. Hoskins, postage	82.80
February	21	A. H. Dondero, Inc., 1928 Hoskins Medal	23.50
February	21	The Schiffer Printing Co., stationery	39.75
February	28	Dr. H. P. Hoskins, traveling expenses	129.73
February	28	Una Anderson, salary for February	120.00
February	28	Dr. Reuben Hilty, traveling expenses	42.06
March	10	T. A. Falconnier, preparing Treasurer's report	20.00
March	10	K. C. V. C. Alumni Association, advertising	10.00
March	10	Book Bldg., Inc., rent for March	223.00
March	10	Dr. H. P. Hoskins, miscellaneous	35.67
March	19	National Asso. B. A. I. Veterinarians, legislation	3,000.00
March	26	Dr. H. Preston Hoskins, salary for March	416.67
March	26	Una Anderson, salary for March	120.00
April	7	Dr. H. P. Hoskins, traveling expenses	41.25
April	7	Dr. T. E. Munce, traveling expenses	25.16
April	7	Dr. M. Jacob, traveling expenses	39.80
April	7	Reindel & Co., office furniture	93.25
April	7	The Schiffer Printing Co., stationery	32.25
April	7	Dr. H. P. Hoskins, postage	51.34
April	7	Dr. H. P. Hoskins, miscellaneous	38.70
April	20	Dr. Reuben Hilty, traveling expenses	35.66
April	20	Dr. Reuben Hilty, traveling expenses	14.07
April	20	The Wolf Detroit Envelope Co., envelopes	20.13
April	20	Dr. E. F. Ahnert, refund of dues	6.00
April	20	Mrs. B. C. Eldredge, refund of dues	10.00
April	28	Mary Andrews, salary to April 30	149.18
May	15	Book Bldg., Inc., rent for May	223.00
May	15	The Maul-Nachtigal Co., office furniture	33.70
May	15	Reindel & Co., office furniture	98.55
May	15	Friesema Bros. Printing Co., reprints	25.00
May	15	Dr. H. P. Hoskins, miscellaneous	44.58
May	29	Mary Andrews, salary for May	125.00
May	29	Marie McCarthy, salary to May 31	135.69
May	29	Dr. H. P. Hoskins, salary for May	416.67
June	4	The Wolf Detroit Envelope Co., envelopes	34.69
June	4	Dr. H. P. Hoskins, postage	54.43
June	4	The Schiffer Printing Co., stationery	22.90
June	4	Dr. H. J. Milks, traveling expenses	40.63
June	4	Dr. W. L. Boyd, traveling expenses	68.81
June	4	Dr. Malcolm J. Harkins, traveling expenses	63.52
June	4	Dr. B. Scott Fritz, traveling expenses	31.80
June	14	K. C. V. C. Alumni Asso., advertising	10.00

June	14	Dr. H. D. Bergman, traveling expenses	61.80
June	22	Reindel & Co., office furniture	28.20
June	22	Dr. H. P. Hoskins, miscellaneous	27.73
July	3	Mary Andrews, salary for June	125.00
July	3	Marie McCarthy, salary for June	120.00
July	6	Dr. David S. White, traveling expenses	26.40
July	6	Dr. C. H. Stange, traveling expenses	73.52
July	6	Dr. T. E. Munce, traveling expenses	42.33
July	6	Book Bldg., Inc., rent for July	223.00
July	16	The Schiffer Printing Co., stationery	10.00
July	30	Dr. R. S. MacKellar, traveling expenses	70.57
July	30	Dr. Reuben Hilty, traveling expenses	132.60
July	30	Mary Andrews, salary for July	125.00
July	30	Marie McCarthy, salary for July	120.00
July	30	Dr. H. P. Hoskins, salary for July	416.67
August	20	Friesema Bros. Printing Co., programs	58.75
August	20	Friesema Bros. Printing Co., printing	35.00
August	20	Dr. H. P. Hoskins, traveling expenses	93.32
August	20	Una Anderson, traveling expenses	67.57
August	28	Dr. H. A. Wilson, Chairman Bldg. Com. Mo. Vet. Med. Asso.	100.00
August	28	Dr. H. P. Hoskins, miscellaneous	32.45
August	28	Marie McCarthy, salary for August	120.00
August	28	Mary Andrews, salary for August	125.00
September	10	Dr. Reuben Hilty, traveling expenses	101.06
September	10	The Schiffer Printing Co., stationery	23.25
September	10	Dr. H. P. Hoskins, postage	106.13
September	21	Book Bldg., Inc., rent for September	223.00
September	21	The Schiffer Printing Co., stationery	29.00
September	21	Dr. H. A. Locke, refund application fee	2.67
September	21	K. C. V. C. Alumni Asso., advertising	10.00
September	21	Dr. M. Jacob, traveling expenses	100.34
September	21	Journal of the A. V. M. A., subscriptions for honorary members	114.00
September	29	Dr. H. P. Hoskins, salary for September	416.67
September	29	Marie McCarthy, salary for September	120.00
September	29	Mary Andrews, salary for September	100.00
September	29	Dr. Geo. H. Conn, refund of dues	3.50
September	29	T. A. Falconnier, preparing Treasurer's statement	5.00
October	9	Master Reporting Co., reporting convention	326.16
October	20	The Wolf Detroit Envelope Co., envelopes	18.60
October	27	Dr. H. P. Hoskins, postage	100.39
October	29	The Wolf Detroit Envelope Co., envelopes	32.70
October	29	Marie McCarthy, salary for October	120.00
October	29	Mary Andrews, salary for October	94.74
November	10	The Schiffer Printing Co., stationery	60.05
November	20	Dr. H. P. Hoskins, miscellaneous	36.48
November	20	Friesema Bros. Printing Co., reprints	22.50
November	29	Dr. H. P. Hoskins, salary for November	416.67
November	29	Marie McCarthy, salary for November	120.00
November	29	Mary Andrews, salary for November	125.00
December	15	Dr. H. P. Hoskins, postage	106.73
December	15	The Schiffer Printing Co., stationery	46.75
December	15	Book Bldg., Inc., rent for December	223.00
December	15	Jewel Emblem Co., radiator emblems	163.17
December	15	K. C. V. C. Alumni Asso., advertising	10.00
December	15	Dr. H. P. Hoskins, traveling expenses	49.72
December	28	Dr. E. P. Althouse, traveling expenses	79.17
December	28	Mrs. H. A. McIntyre, refund of dues	5.00
December	28	Dr. H. P. Hoskins, office salaries	160.30
Total			$13,958.93

DISBURSEMENTS
January 1 to December 31, 1928
JOURNAL FUND

1928			
January	10	The Schiffer Printing Company, envelopes	$ 6.35
January	10	Friesema Bros. Printing Co., reprints	39.93
January	21	Friesema Bros. Printing Co., printing January Journal	998.75
January	28	Alice Laverick, salary for January	140.00
February	4	Dr. H. P. Hoskins, postage	63.91
February	4	The Wolf Detroit Envelope Co., Journal envelopes	150.49
February	4	Friesema Bros. Printing Co., reprints	76.26
February	4	Elliott Addressing Machine Co., addressing machine with allowance on old one traded in	284.20
February	4	Book Bldg., Inc., rent for February	223.00
February	21	Friesema Bros. Printing Co., printing February Journal	1,001.37
February	21	Dr. H. P. Hoskins, postage	37.71
February	28	Dr. H. P. Hoskins, miscellaneous	72.60
February	28	Dr. H. P. Hoskins, salary for February	500.00
February	28	Alice Laverick, salary for February	140.00
March	10	Friesema Bros. Printing Co., reprints	210.57
March	19	Dr. H. P. Hoskins, old journals	40.86
March	26	Dr. H. P. Hoskins, postage	79.29
March	26	Alice Laverick, salary for March	140.00
April	7	Friesema Bros. Printing Co., printing March Journal	1,901.00
April	7	Book Bldg., Inc., rent for April	223.00
April	7	Dictaphone Sales Corp., 1 transcribing machine	201.60
April	7	Friesema Bros. Printing Co., reprints	269.42
April	19	Friesema Bros. Printing Co., printing April Journal	1,122.50
April	19	Dr. H. P. Hoskins, miscellaneous	111.52
April	19	Dr. H. P. Hoskins, postage	63.56
April	28	Alice Laverick, salary, April 1 to April 15	70.00
April	28	Friesema Bros. Printing Co., reprints	225.71
April	28	Una Anderson, salary for April	130.00
April	28	Dr. H. P. Hoskins, salary for April	500.00
May	15	Friesema Bros. Printing Co., printing May Journal	1,011.50
May	15	Dr. H. P. Hoskins, postage	73.96
May	29	Friesema Bros. Printing Co., reprints	92.95
May	29	Dr. H. P. Hoskins, miscellaneous	156.38
May	29	Una Anderson, salary for May	130.00
June	14	Book Bldg., Inc., rent for June	223.00
June	14	Everton Engraving Co., plates	45.00
June	14	Friesema Bros. Printing Co., printing June Journal	1,010.75
June	22	Dr. H. P. Hoskins, postage	65.83
July	3	Friesema Bros. Printing Co., reprints	68.75
July	3	Una Anderson, salary for June	130.00
July	3	Dr. H. P. Hoskins, salary for June	500.00
July	16	Friesema Bros. Printing Co., printing July Journal	1,010.00
July	16	Dr. H. P. Hoskins, miscellaneous	55.29
July	30	Una Anderson, salary for July	130.00
August	20	Friesema Bros. Printing Co., reprints	34.25
August	20	Dr. H. P. Hoskins, old journals	33.75
August	20	Book Bldg., Inc., rent for August	223.00
August	20	Friesema Bros. Printing Co., printing August Journal	1,016.25
August	20	Dr. H. P. Hoskins, postage	49.97
August	28	Dr. H. P. Hoskins, miscellaneous	100.36
August	28	Dr. H. P. Hoskins, salary for August	500.00
August	28	Una Anderson, salary for August	130.00
September	21	Friesema Bros. Printing Co., reprints	32.25
September	21	Friesema Bros. Printing Co., printing September Journal	969.82

September 29	Dr. H. P. Hoskins, miscellaneous	84.71
September 29	Dr. H. P. Hoskins, postage	54.21
September 29	Una Anderson, salary for September	130.00
October 20	Friesema Bros. Printing Co., printing October Journal	1,024.87
October 20	Friesema Bros. Printing Co., reprints	174.95
October 20	Book Bldg., Inc., rent for October	223.00
October 27	Dr. H. P. Hoskins, postage	52.60
October 27	Dr. H. P. Hoskins, miscellaneous	53.61
October 29	Dr. H. P. Hoskins, salary for October	500.00
October 29	Una Anderson, salary for October	130.00
November 10	Book Bldg., Inc., rent for November	223.00
November 20	Friesema Bros. Printing Co., printing November Journal	1,028.37
November 20	Dr. H. P. Hoskins, postage	61.81
November 27	Una Anderson, salary for November	130.00
November 27	Friesema Bros. Printing Co., reprints	100.92
December 15	Dr. H. P. Hoskins, miscellaneous	67.36
December 15	Friesema Bros. Printing Co., printing December Journal	1,027.50
December 28	Dr. H. P. Hoskins, postage	63.97
December 28	Una Anderson, salary for December	130.00
December 28	Dr. H. P. Hoskins, salary for December	500.00
Total		$22,628.44

Visitors at the Journal Office

During the past few months about a score of veterinarians have called at the JOURNAL office on various missions. Included among the out-of-town visitors were the following: Dr. T. A. Sigler, Greencastle, Ind.; Drs. Reuben Hilty and Warren P. S. Hall, of Toledo, Ohio; Dr. H. H. Sparhawk, of Akron, Ohio; Dr. O. C. Anderson, of Northville, Mich.; Dr. B. J. Killham, of Lansing, Mich.; Dr. Edward A. Cahill and Mr. J. E. Bartlett, of Indianapolis, Ind.; Dr. O. H. von Rosenberg, of Hallettsville, Texas; Drs. J. W. Patton and R. P. Lyman, of East Lansing, Mich.

The following Detroit veterinarians have stopped at the office recently: Drs. C. W. Eddy, H. T. Carpenter, David T. Kemp, John Hoberg, E. E. Patterson, J. E. Patterson, L. H. LaFond, S. P. Giebelhaus, G. W. Rawson, A. S. Schlingman, O. A. Taylor, and R. F. Vermilya.

SOLID

Little Girl (to grandfather): "Grandpa, why don't you grow hair on your head?"

Grandpa: "Well, why doesn't grass grow on a busy street?"

Little Girl: "Oh, I see; it can't get up through the concrete."

ASSOCIATION MEETINGS

McLEAN COUNTY VETERINARY MEDICAL ASSOCIATION

The annual meeting of the McLean County Veterinary Medical Association was held at the Association of Commerce rooms, Bloomington, Ill., January 30, 1929. About twenty veterinarians were in attendance, which is considered a good turn-out for a winter meeting.

Contagious abortion in cattle was the principal subject discussed by the contributors to the program. A paper entitled, "Control of Contagious Abortion in Cattle," prepared by Dr. V. S. Larson, formerly state veterinarian of Wisconsin, was read by the Secretary. Dr. Larson is now assigned to special work on abortion control and he is doing pioneer work in this field. Dr. L. N. Morin, of McLean, discussed the cause, course, prognosis and treatment of abortion disease. Drs. W. H. Welch, of Lexington, and C. L. Lehman, of Flanagan, discussed the relation of abortion to sterility. The prevalence of the disease was discussed by Drs. F. E. Hagy, of Lostant; James Smellie, of Eureka; F. H. Wessels and E. J. Hart, of Pontiac; P. L. Varble, of Bloomington, and L. W. Moore, of Lexington.

Undulant fever was another disease discussed by the Association. Among those who participated were Dr. Frank Deneen, of Bloomington, president of the McLean County Medical Association; Dr. George D. Heath, City Health Officer of Bloomington, and Dr. T. G. Hull, of the State Department of Health, Springfield.

Officers for 1929 were elected as follows: President, Dr. N. I. Stringer, Wenona; vice-president, Dr. C. L. Lehman, Flanagan; and secretary-treasurer, Dr. J. S. Koen, Bloomington.

J. S. KOEN, *Secretary.*

VETERINARY MEDICAL ASSOCIATION OF NEW JERSEY

The forty-sixth annual meeting of the Veterinary Medical Association of New Jersey was held at the Hotel Plaza, Jersey City, January 30-31, 1929, with a record attendance.

A smoker and business meeting was held the evening of the first day, while the literary program occupied most of the second day.

The opening address was given by the President, Dr. J. H. McNeil, chief of the Bureau of Animal Industry, Trenton. Dr. McNeil spoke of the work of the Bureau and its relationship with the veterinarian.

Dr. T. E. Munce, president of the American Veterinary Medical Association spoke on "Veterinary Medicine and the A. V. M. A." He outlined the purpose and program of this Association and stressed the importance of a closer harmony between the state associations and the American Veterinary Medical Association.

Dr. H. E. Bemis, professor of surgery, Veterinary School, University of Pennsylvania, Philadelphia, gave an illustrated talk on "The Veterinary Schools of Central and Northern Europe." An outstanding fact revealed by Dr. Bemis was the extensive amount of equipment available for veterinary education in Europe as compared with that available in this country. Dr. Bemis' talk was most interesting to all.

The subject of "Necrobacillosis" was presented by D. H. Udall, professor of medicine and ambulatory clinic at the New York State Veterinary College at Cornell University, Ithaca, N. Y. The wealth of material presented in the Ambulatory Clinic has given the speaker a very intimate knowledge of this affection.

Dr. E. A. Crossman, B. A. I. Inspector-in-Charge, Tuberculosis Eradication, Boston, Mass., presented an interesting paper on "The Veterinarian's Part in the Production of Clean Milk." Dr. John G. Hardenbergh, Veterinarian, Walker-Gordon Laboratories Co., Plainsboro, presented the subject, "Problems in Milk Control." Both of these papers, dealing with one of the most important phases of veterinary practice, were received with interest.

After the literary program, the following officers were elected for the ensuing year: President, Dr. H. C. Millar, Asbury Park; 1st vice-president, Dr. R. W. Butterworth, Paterson; 2nd vice-president, Dr. W. B. Maxson, Flemington; secretary, Dr. E. R. Cushing, Plainfield; and treasurer, Dr. Harry Ticehurst, Shrewsbury.

E.R. CUSHING, *Secretary.*

SOUTH DAKOTA VETERINARY MEDICAL ASSOCIATION

The annual meeting of the South Dakota Veterinary Medical Association was held at the Marvin Hughitt Hotel, Huron,

January 30-31, 1929. Dr. E. A. Dornbusch, president of the Association, presided at the several sessions.

The address of welcome was given by Mr. G. R. McArthur, secretary of the Huron Chamber of Commerce. President Dornbusch responded and the minutes of the previous meeting were read by the Secretary.

Dr. L. D. Mersch, of Sioux Falls, read a paper that had been prepared by Dr. J. H. Weiner, of Kansas City, Mo., entitled, "Nostrums that I Have Met." A paper entitled, "Filth Diseases of Swine," read by Dr. Harold J. Classick, of Hurley, proved to be very interesting and brought out a good discussion. Dr. R. E. Harvey, of Bonesteel, presented an interesting case report. Dr. R. French, of Redfield, read a paper on "Swamp Fever in Horses," with which he had quite a bit to do in his section some years ago.

In the evening a banquet was held. All after-dinner speakers were barred. The entertainment for the evening was under the direction of Mrs. H. A. Hartwich, who acted as toastmistress. Entertainment was furnished by the Huron College Glee Club.

The morning of the second day of the meeting, Dr. S. H. McNutt, of Iowa State College, was the first speaker and presented "Some Swine Diseases." He discussed swine pox and abortion in swine. Dr. J. O. Wilson, of Pierre, followed with a report on "Tuberculosis in South Dakota." Dr. M. W. Ray, State Veterinarian, favored the Association with a few remarks. Dr. J. O. F. Price, of Algona, Iowa, gave a talk on "Hog Cholera Control." Dr. Frank Breed, of Lincoln, Nebr., discussed "Poultry Diseases." The last speaker of the day was Dr. W. L. Boyd, of the University of Minnesota, who spoke on "Cattle Diseases." Abortion and sterility were the main topics discussed by Dr. Boyd.

At the business session four new members were admitted and new officers were elected as follows: President, Dr. G. P. McCue, of Aberdeen; vice-president, Dr. Harold J. Classick, of Hurley; secretary-treasurer, Dr. Wm. P. Brower, Menno.

BEN ANDERSON, *Secretary.*

ALABAMA VETERINARY MEDICAL ASSOCIATION AND SHORT COURSE FOR VERERINARIANS

The sixth annual Short Course for Graduate Veterinarians, and the Alabama Veterinary Medical Association met at the College of Veterinary Medicine, Alabama Polytechnic Institute, at

Auburn, Feb. 4-9, 1929. There were in attendance 45 veterinarians from eight states. The course was made up of lectures, clinical diagnostic demonstrations and surgical operations.

Dr. E. L. Quitman, of Chicago, was given all the clinical cases in dogs and cats that he could handle. Lectures were not confined to short periods. Dr. Quitman gave lectures lasting for one to two hours. Veterinarians were given a chance to ask questions and the lecturer could then make clear the points in question to aid the practitioner in problems that were not well understood, or unknown to him. New methods in diagnosing and treating many well-known old diseases of dogs and cats were taken up by Dr. Quitman and carefully explained to the great satisfaction of the veterinarians.

Dr. T. H. Ferguson, of Lake Geneva, Wisconsin, operated on a case of poll evil in a mule. He very nicely demonstrated his modification of the Williams operation. He also did various operations that were asked for by the veterinarians; he gave a clinic on teat and udder diseases lasting nearly three hours. He also described his methods of diagnosing and treating diseases of the sinuses of the head in the cow, and of the pharynx, esophagus and mouth. He described his method of doing a rumenotomy operation for foreign bodies, atony of rumen and impaction of the rumen. He also gave his methods of diagnosing and handling cases of sterility in the cow. In a case of auto-intoxication paralysis, he flooded the rumen with 20 gallons of water, and then massaged the rumen; the next morning the cow was up and in good condition. He did a neat and unique operation on a pig with scrotal hernia.

Dr. W. E. Cotton, of the B. A. I. Experiment Station, Bethesda, Md., lectured on foot-and-mouth disease. This lecture was followed by moving pictures, showing the California and Texas outbreaks of foot-and-mouth disease. Dr. Cotton paid special attention to his methods of diagnosis. He also gave a very interesting and instructive lecture on abortion disease in cattle.

Dr. E. C. McCulloch demonstrated two methods of making intradermal injections in chickens for diagnosis of tuberculosis. Dr. Ed Everett demonstrated the way to use the tube for administering an anthelmintic directly into the intestines of a chicken. Dr. Cary operated on a roarer, a mule weighing 1200 pounds.

The usual annual banquet was given by the Students' Veterinary Medical Association.

At the business meeting of the Alabama Veterinary Medical Association, the following officers were elected: President, Dr. G. J. Phelps, Montgomery; vice-president, Dr. J. R. Sullivan, Montgomery; secretary-treasurer, Dr. C. A. Cary, Auburn.

C. A. CARY, *Secretary-Treasurer.*

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was called to order by the President, Dr. H. K. Miller, at the Academy of Medicine, Wednesday evening, February 6, 1929. Due to the severe illness of his mother, Dr. R. J. Garbutt, Secretary, was obliged to be absent and the Chair appointed Dr. R. S. MacKellar as secretary *pro tem.*

The minutes of the January meeting were read and approved.

Drs. S. A. Goldberg and R. S. MacKellar gave a report on the postmortem examination of a valuable imported stallion, which had died without the exact cause of death being determined. Two veterinarians who attended this animal differed radically in their diagnoses. One stated that the animal was suffering from meningitis and the other that it was a case of nephritis. The postmortem examination revealed the brain, spinal cord, kidneys and in fact all of the internal organs to be in a normal condition, with the exception of slight postmortem changes.

Nothing of note was found until the cecum and large colon were opened. These organs were found to contain numerous small parasites (cylichostomes). In many places on the mucosa there were grayish pitted ulcers, probably of parasitic origin. The opinion, based on this examination, was that death had been caused by the toxemia due to general infection, probably by a member of the colon-enteritidis group of bacteria. This resulted, directly or indirectly, from the presence of extremely large numbers of cylichostomes present in the cecum and large colon.

The foregoing report was productive of quite an animated discussion which was participated in by a number of the members present including Drs. Kock, Little, Slawson, Chase and others. It was the opinion of many of the members that probably a great many horses that die, due to rather vague causes, such as forage poisoning, meningitis, nephritis, etc., probably succumb to parasitic infection similar to that found in the case cited.

The discussion on parasites led to other questions being asked about lung worms in hogs and the best treatment for the same. Dr. Goldberg answered that the best results were obtained by taking care of the young when born and by cleaning up the premises. The life cycle of the parasite is not fully known.

Dr. L. A. Wright, of Columbus, Wis., was present as a visitor and gave an interesting account of parasitic infestation of horses in the West. He spoke also of lung worms in hogs and recommended clean fresh quarters and liberal doses of turpentine. Dr. Wright, who is interested in fox-raising, also spoke of parasitic infestations in these animals. He stated that it is necessary to provide clean sanitary cages, raised from the ground, to prevent re-infestation and recommended the use of colloidal suspensoid (Chandler) given in 20-min. capsules.

Dr. Jacob Lebish exhibited a Chow pup, which upon the least excitement or movement evidenced a peculiar involuntary lateral shaking of the head. Dr. Lebish stated that he had eliminated all intestinal parasites as a possible cause of the condition, but without results. It was the opinion of a number of the veterinarians present that this was a parathyroid condition and it was suggested that parathormine be used in treating the case.

Drs. W. K. Rogers and Charles J. Goubeaud then gave a very interesting demonstration of the Flagg method of intratracheal anesthesia on a dog. This method was developed under the supervision of Dr. Chevalier Jackson. Before the demonstration, Dr. Goubeaud read a paper on the subject, explaining the technic and advantages of this method of anesthesia. He said, in part, that it is very simple and efficient. It maintains a perfect anesthesia with a maximum degree of safety and with a minimum amount of the anesthetic used, eliminating the commonly seen delays on the part of the surgeon, due to the patient becoming too light.

The apparatus consists of:

1. Laryngoscope.
2. Flagg's inhalation-tube with bronchoscopic tip.
3. Rubber connecting tubing.
4. Ether-can with three holes in top.

The procedure is to restrain the animal first in the usual way. A few drops of castor oil are placed in each eye to protect the organs from the ether vapor. Then the patient is put under by the cone-drop method. The head is then extended and a gag put in place. The tongue is drawn up and forward and the epiglottis exposed. The laryngoscope is then passed between the vocal

cords, and the intratracheal tube is passed into the trachea. The laryngoscope is removed and the patient is found to be breathing quietly through the tube. Two drams of ether are poured into the can and replaced as often as necessary.

The advantages of the method are as follows:

1. Normal respiratory rhythm and amplitude.
2. Perfect relaxation.
3. Complete control of artificial respiration.
4. Ability to maintain the lightest anesthesia.
5. Eliminates drugs acting on respiratory center.
6. Eliminates surgeon's worry.
7. Simplicity.
8. Short period of recovery.
9. Dullness and inappetence dispensed with.
10. Exclusion of foreign matter, such as blood and vomitus.
11. Maintenance of ether anesthesia for operations on mouth, nose, throat and sinuses.
12. Aseptic field for operation about the face.

In large dogs it is necessary to pack gauze around the tube to prevent the escape of air and ether, due to the varying size of the glottis. This practical demonstration was carried out very successfully and the members present were greatly interested in the procedure.

Due to the lateness of the hour, the question-box was omitted. A unanimous vote of thanks was tendered the contributors to the program of the evening.

On motion duly seconded and carried, the Secretary *pro tem* was instructed to convey to Dr. Garbutt the sympathy of the Association, with the hope that his mother would soon be fully restored to health.

R. S. MacKellar, *Secretary pro tem.*

MANITOBA VETERINARY ASSOCIATION

The annual meeting of the Manitoba Veterinary Association was held at the Royal Alexandra Hotel, Winnipeg, February 12, 1929. Dr. W. A. Shoults, of Winnipeg, occupied the chair. There was a good attendance of members from all parts of the Province.

In his presidential address, Dr. Shoults referred to the very limited output of qualified veterinarians from the colleges at the present time and stressed the necessity of enlightening the public as to the value of the services of the veterinarian, in order that there might be greater inducements for our young men to enter the veterinary profession.

The report of the Secretary-Treasurer and Registrar showed the Association to be in a sound financial condition with a

balance of $717.57 on hand. The Register showed 112 active members and 11 honorary members.

The question of the formation of a Western Canada Veterinary Association, comprising the western provinces, was discussed and a motion was passed expressing sympathy with the idea. A committee was appointed to go into the matter further with the other provinces.

A committee was also appointed to meet the Minister of Agriculture for the Dominion to place before him the question of services of practicing veterinarians being utilized in assisting the veterinary inspectors of the Health of Animals Branch in restricted-area tuberculin testing.

A motion was passed and a committee was formed to take up with the federal and provincial governments and the Research Council of Canada the question of providing greater facilities for research work in the diseases and conditions causing losses among live stock.

It was decided that the next summer clinic be held at Brandon.

Dr. W. J. Hinman, one of the founders of the Manitoba Veterinary Association, was elected an honorary member.

The following officers were elected for the ensuing year: President, Dr. Owen McGuirk, Dauphin; vice-president, Dr. H. H. Ross, Brandon; secretary-treasurer and registrar, Dr. Wm. Hilton, Winnipeg; Council, Drs. J. B. Still, Wm. Hilton, Owen McGuirk, A. L. Alton, H. H. Ross, A. Savage and J. R. Fisher; Board of Examiners, Drs. J. B. Still, A. Savage and Wm. Hilton; Auditors, Drs. R. G. Fox and A. J. Allen.

During the afternoon session a number of highly interesting papers and addresses were given.

WM. HILTON, *Secretary-Treasurer.*

HUDSON VALLEY VETERINARY MEDICAL SOCIETY

The regular quarterly meeting of the Hudson Valley Veterinary Medical Society was held in Albany, N. Y., February 13, 1929. Dr. Wm. Henry Kelly, of Albany, occupied the chair.

About 35 members, wives and guests attended this meeting and, after luncheon, listened to an address on parasites of fur-bearing animals delivered by Dr. Karl B. Hanson, Director, U. S. Fur Animal Experiment Station, Saratoga Springs, N. Y.

Dr. Hanson gave a very instructive talk on methods of administering treatment to foxes for the purpose of controlling parasites

in these animals, as well as the importance of sanitation in their care. He showed a number of instruments that are used in administering treatment and gave suggestions as to handling fur-bearing animals in captivity.

After Dr. Hanson's address, case reports were rendered and discussed by members present and several interesting experiences were given.

J. G. WILLS, *Secretary.*

SOUTHEASTERN STATES VETERINARY MEDICAL ASSOCIATION

The thirteenth annual meeting of the Southeastern States Veterinary Medical Association was held at the Hotel Patton, Chattanooga, Tenn., February 15-16, 1929. It was one of the largest and most enthusiastic meetings ever held by the Association.

A large number of members from the nine states were present, as well as a number of outstanding men from other states who took part in the program that was a success in every way. Some interesting papers were read and discussed and these brought out many interesting features.

A banquet was held the evening of the first day, with Dr. F. E. Kitchen, of Greenville, S. C., acting as toastmaster. The more distinguished guests were asked to speak and all responded with many encouraging ideas for the profession. Most of the men present, as well as many of the ladies, made informal talks. Dick Parks, of the Chattanooga Chamber of Commerce, sang several selections and the "little black nephew" gave some dances that were pleasing to all.

A short business session was held, with the election of the following officers: President, Dr. F. E. Kitchen, Greenville, S. C.; 1st vice-president, Dr. W. B. Lincoln, Nashville, Tenn.; 2nd vice-president, Dr. W. F. McLendon, Athens, Ga.; 3rd vice-president, Dr. D. A. Piatt, Birmingham, Ala.; secretary-treasurer, Dr. M. R. Blackstock, Spartanburg, S. C.

A number of ladies accompanied their husbands to Chattanooga and were royally entertained by the Local Committee on Arrangements. Suitable resolutions were passed and all joined in thanking Dr. F. W. Morgan, of Chattanooga, as well as the members of his committee, for the pleasant and profitable time had by all.

M. R. BLACKSTOCK, *Secretary-Treasurer.*

NECROLOGY

JOHN L. DEVEREAUX

Dr. John L. Devereaux died very suddenly, at his home in Waterbury, Connecticut, January 31, 1928. He was born in Waterbury, December 31, 1864. He was graduated from the Ontario Veterinary College in 1898 and practiced in Waterbury until the time of his death.

Dr. Devereaux joined the A. V. M. A. in 1913. He was a member of the Connecticut Veterinary Medical Association, Knights of Pythias, Redmen of the World and the Woodmen of the World.

HARRISON H. GEORGE

In the death of Dr. Harrison H. George, which occurred in Cleveland, Ohio, March 6, 1929, the veterinary profession and the U. S. Bureau of Animal Industry lost a particularly creditable member.

Born at Noblesville, Ind., in 1858, Dr. George passed his early life on a stock farm, taught school, entered the Chicago Veterinary College and was graduated in 1890. He practiced veterinary medicine for a period of seven years. In 1898 he was appointed an assistant inspector in the Bureau of Animal Industry and assigned to Kansas City. Later he was promoted to the position of Inspector-in-Charge at Louisville, Ky., and subsequently was in charge of the meat inspection stations at So. St. Joseph, Mo., Indianapolis, Ind., and Columbus, Ohio. Since 1913, he had been in charge of the important station at Cleveland and had come to be looked upon as one of the outstanding men among those in charge of stations.

Dr. George joined the A. V. M. A. in 1908. He was a prominent member of the Lakewood Methodist Episcopal Church in Cleveland and was also associated with the Cleveland Chamber of Commerce. No one could have known Dr. George intimately without having a great admiration for his unusual intellect, his culture and his nobility of character, as revealed by his integrity, acts of kindness and charity, and his unswerving and self-sacrificing devotion to duty. His personal interests were always held subservient to the rights of others and to matters relating to his official duties.

To the writer of this paragraph, Dr. George was best known as a student. Though not then past the age of thirty, he was looked upon by the younger students as one of the "old men" of the class and as such his advice was frequently sought and his influence felt. He stood for clean scholarship, and, as in later years, for clean living and idealism. Any profession might well have welcomed him. He is survived by two sons and two grandchildren.

G. W. P.

JOHN UPSHALL

Dr. John Upshall, of Brampton, Ontario, died January 26, 1929. He was a graduate of the Ontario Veterinary College, class of 1868. Following his graduation, Dr. Upshall practiced at Clinton, Ontario, for a while. Then he went to Australia and remained there for several years. Returning to America, he located at Peru, Indiana, and engaged in practice there. He returned to Canada and made his home at Brampton, where he died. The remains were taken to Peru, Indiana, for burial.

CHARLES M. ELLIOTT

Dr. Charles M. Elliott died at his home at Goehner, Nebraska, March 26, 1929, at the age of 54 years, from the effects of a malignant tumor. Dr. Elliott was graduated from the Kansas City Veterinary College with the class of 1908, and was engaged in general practice at Seward, Beaver Crossing, Hooper and Goehner, Nebr., at different times. He leaves a wife and two children to mourn his loss. He joined the A. V. M. A. in 1911.

Our sympathy goes out to Dr. and Mrs. A. T. Kinsley, of Kansas City, Mo., in the death of Mrs. Kinsley's father, Mr. G. A. Smith, on April 3, 1929, in his 80th year; and to Dr. Henry B. Wescott, of Portland, Maine, in the death of his mother, Mrs. Susie M. Wescott, on January 9, 1929.

PERSONALS

MARRIAGE

Dr. C. C. Harting (Ind. '11), of Waveland, Ind., to Miss Hazel Jones, of Danville, Ind., April 17, 1929, at Danville, Ind.

BIRTHS

To Dr. and Mrs. R. T. Gregory, of Newport News, Va., a son, Howard Evans, December 29, 1928.

To Dr. and Mrs. Isac Vought Stoll, of Rome, Pa., a son, Robert, January 5, 1929.

To Dr. and Mrs. H. E. Bemis, of Philadelphia, Pa., a daughter, Suzanne, April 1, 1929.

To Dr. and Mrs. M. J. Hughes, of Newark, N. J., a son, Edward M. J., April 10, 1929.

To Dr. and Mrs. C. L. Briggs, of DuBois, Pa., a daughter, Margaret Marie, April 21, 1929.

PERSONALS

Dr. F. W. Silberg (Chi. '12) has removed from Spencerville, Ind., to Butler, Ind.

Dr. J. L. Heitt (Chi. '20), of Red Bluff, Calif., is Tehama County Veterinarian.

Dr. Roy L. Ramsey (Gr. Rap. '06), of Lapeer, Mich., is Lapeer County Veterinarian.

Dr. John H. Winter (Gr. Rap. '17), of Adrian, Mich., is Lenawee County Veterinarian.

Dr. H. D. Port (Chi. '14) is state veterinarian of Wyoming, with headquarters at Cheyenne.

Dr. William A. Seabury (Gr. Rap. '99), of Madera, Calif., is Live Stock Inspector for Madera County.

Dr. A. O. Haverfield (O. S. U. '26) has removed from Wheeling, W. Va., to Cadiz, Ohio. Address: Route No. 8.

Dr. Chauncey C. Stevens (Ont. '02), of Port Huron, Mich., holds the position of City Veterinarian of Port Huron.

Dr. J. A. Webb (U. P. '16), formerly of Avondale, Pa., is now located in Atlantic City, N. J. Address: 7001 Ventnor Ave.

Dr. Rex D. Bushong (K. S. A. C. '21), of Manhattan, Kans., is Assistant Milk Specialist with the U. S. Public Health Service.

Dr. C. A. Lewis (Gr. Rap. '16), of Evart, Mich., has been appointed Secretary of the Osceola County Fair for the current year.

Dr. Albert L. Danielson (St. Jos. '21), formerly of De Noya, Okla., has located at Bentonville, Ark., to engage in private practice.

Dr. D. R. Cook (San Fran. '18), who has been located at the Bellevue Ranch, Merced, Calif., has moved to Fresno, Calif. Address: 3345 Alta Ave.

Dr. A. T. Peters (Stuttgart), of Peoria, Ill., was chosen District Governor, at the 44th District Conference of Rotary, held at Springfield, Ill., recently.

Dr. L. M. Esh (U. P. '28) has located at Allensville, Pa., after spending a year as instructor in veterinary medicine at the University of Pennsylvania.

Dr. Philip P. Poley (Corn. '28), formerly of Amenia, N. Y., has moved to Kingston, N. Y., where he has taken over the practice of the late Dr. J. A. Huhne.

Dr. R. V. Westerberg (Ont. '27), who has been associated with Dr. B. D. Radcliffe (Chi. '08), of New Britain, Conn., for some time, has removed to Simsbury, Conn.

Dr. C. H. Larson (Iowa '23), formerly on the milk inspection staff of the Kansas City (Mo.) Health Department, has located at Clarksville, Arkansas, for general practice.

Dr. B. R. McCrory (Colo. '27), formerly of Tulsa, Oklahoma, has changed locations and is now conducting a general practice and hospital at 109 North Third Street, Chickasha, Okla.

Dr. A. E. Bott (Chi. '13), of East St. Louis, Ill., vice-president and general manager of the Corn Belt Serum Company, has announced his candidacy for a place on the East St. Louis Board of Education.

Dr. H. R. Fosbinder (Chi. '10), of Hollywood, Calif., is now located in his new Hollywood Cat and Dog Hospital, at 1151 N. Highland Avenue, "where pets are treated right," according to his letterhead.

Dr. F. D. McMahon (Chi. '20) has returned to his home in Jerseyville, Ill., after spending the winter months in El Paso, Texas, in the interests of his health. Dr. McMahon is Secretary of the Jersey County Fair Association.

Dr. W. F. Flanary (Ont. '10), of St. Charles, Minn., sustained a fracture of the right forearm, just above the wrist, while attending a patient on April 8. A report received about two weeks after the accident indicated that the fracture was mending satisfactorily.

Dr. Wm. Geo. Chrisman (Ont. '02) resigned his position as Meat and Milk Inspector of the City of Danville, Va., on December 12, 1928, and accepted the position of Chief Field Veterinarian for the State Department of Agriculture, Baltimore, Md., assuming his new duties January 1, 1929.

Dr. M. J. Hughes (N. Y. U. '20), of the Health Department of Newark, N. J., has been having some interesting experiences breeding and raising English setters, New Zealand Red and White rabbits, Black Flemish Giant rabbits, and guinea pigs, at his country place, at Dunellen, N. J.

Dr. R. S. MacKellar (N. Y. C. V. S. '94), of New York, N. Y., made a trip to Albany, N. Y., April 1, to appear before Governor Roosevelt, in behalf of the Thompson Bill, which would prohibit the cropping of dogs' ears in the Empire State. Dr. Wm. Henry Kelly (N. Y. C. V. S. '89), of Albany, also spoke in behalf of the proposed legislation.

Dr. L. A. Merillat (Ont. '88), of Evanston, Ill., sailed for Europe, on the SS. *Coronia*, April 26, to be gone several months. He was accompanied by Mrs. Merillat. They will make Paris their headquarters while visiting points of interest in France. Dr. Merillat will extend the greetings of North American veterinarians to the Permanent Committee of the International Veterinary Congress which meets in Paris this month.

Dr. B. T. Woodward (U. P. '02), Director, Scientific Department, H. Clay Glover Co., Inc., New York, N. Y., delivered a radio address, entitled, "Distemper of Dogs and Alleged Distemper Cures," over Station WABC, of the Columbia Broadcasting System, on March 14. Dr. Woodward warned dog-owners against nostrums for which false and fraudulent claims are made, and incidentally sounded a note of warning to storekeepers, that the interstate movement of such misbranded preparations was a violation of the Federal Food and Drug Act.